ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-DO-242 and 45-DO-243, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

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ABSTRACT

Sites 45-DO-242 and 45-DO-243 are on the south bank of the Columbia River (RM 579), on either side of a steep draw draining a massive escarpment of colluvial terraces. Located in the Upper Sonoran life zone, they lay on a narrow alluvial fan about 2 m above the river prior to dam construction. The University of Washington excavated 174 m^3 at 45-DO-242 and 85 m^3 at 45-DO-243 in 1979 for the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic unaligned random sampling with 1 x 1-m excavation units with 1 x 2 and 2 x 2-m cells disclosed at least four cultural occupations at both sites. Nine radiocarbon dates from 45-DO-242 place cultural activity from about 3500-200 B.P. A single radiocarbon date from 45-DO-243 dates the most recent occupation after about 1500 B.P. Projectile points from both sites indicate occupations prior to 4000 B.P. Most cultural activity, including a probable winter village at 45-DO-242, occurred in the Hudnut Phase (ca. 4000-2000 B.P.). Site assemblages are remarkably consistent, with diagnostic artifacts and tool types reflecting an emphasis on hunting, partially supplemented by gathering. The presence of a village site, dated at 3500 B.P. and located between earlier and later occupations characterized as hunting and gathering camps, documents shifting patterns of site use characteristic of at least the last 5,000 years in the Rufus Woods Lake project area.

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PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1975), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

ACKNOWLEDGEMENTS

This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, Coprincipal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since the autumn of 1981, Dr. Jaehnig has served as Coprincipal Investigator with Dr. Dunnell.

Three Corps of Engineers staff members have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rare skill, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of project. The Tribes' Business Council and its History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, former representative from the Nespelem District on the Business Council, and to Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate federal and state agencies of the necessity of the investigation. They helped secure land and services for the project's field facilities as well as helping establish a program which trained local people (including many tribal members) as field excavators and laboratory technicians. Beyond this, their hospitality has made our stay in the project area a most pleasant one. In return, conscious of how much gratitude we wish to convey in a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph, in particular.

Both 45-DO-242 and 45-DO-243 are located on lands owned by the State of Washington, which we thank for granting us permission to excavate the sites.

As authors of this report, we take responsibility for its contents. What we have written here is only the final stage of a collaborative process which is analogous to the integrated community of people whose physical traces we

have studied. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Coprincipal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. Loraine Gross and Janice Freedman directed the excavations.

S. Neal Crozier did the initial data summary for the stratigraphic analysis; Susan Freiberg and Valerie Barber performed the chemical and mechanical sort analyses. Dorothy Sammons-Lohse compiled the data for feature analysis and zone definitions. The laboratory staff, headed by Karen Whitlesey, did the technological and functional artifact analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is a cooperative effort. Dr. Ernest S. Lohse wrote Chapter 1, 3, and 6. As senior author, he also co-ordinated and integrated the contributions of the other authors. S. Neal Crozier and Sarah Campbell wrote Chapter 2; Stephanie Stephanie Livingston and R. Lee Lyman analyzed the faunal assemblage and wrote Chapter 4; Dorothy Sammons-Lohse analysed the feature assemblage and wrote Chapter 5.

Marc Hudson edited the text, Dawn Brislawn typed the text; they jointly co-ordinated production. Fred Clark drafted many of the working copy figures and Melodie Tüne and Bob Radek drafted the final versions. Larry Bullis photographed the artifacts. Final production of camera-ready copies was accomplished by Charolette Beck, Natalie Cadoret, and Philippa Coiley under the direction of Sarah Campbell.

1. INTRODUCTION

Sites 45-DO-242 and 45-DO-243 are on the left bank of the Columbia River about 100 meters and 150 meters, respectively, downstream from River Mile (RM) 579 in the SE1/4 of the SE1/4 of Section 36, T31N, R29E, Alameda Flat Quadrangle (U.T.M. Zone 11, N.5333500, E.343500) (Figure 1-1). A narrow, deep draw separates the two sites. Site 45-DO-242 lies to the east on a small, low terrace beneath a steep, talus-laden, north-facing slope that rises to a still higher, broader terrace. To the west on the same elongated terrace remnant, 45-DO-243 lies beneath another, steep, north-facing slope that rises to a higher terrace, where 45-DO-244 is located. The latter is a burial site excavated as part of the Corps of Engineer's burial relocation program (Contract DACW67-78-C-0106). Plate 1-1 is a view of 45-DO-242 to the east and Plate 1-2 is a view of 45-DO-243 to the northeast.

The three sites share an abrupt, steep drainage that plunges down from the terraces above the river. To the south, the land gains 200 m in elevation in less than 300 m (Figure 1-2). Once less than 2 m above the Columbia River, 45-DO-242 and 45-DO-243 now lie on narrow terraces partially inundated by Rufus Woods Lake. Aboriginally, the sites would have been most easily approached along the sandy banks of the river. The steep drainage channel would have provided a convenient route to the uplands to the south.

The site surfaces are now beaches, fringed with sparse stands of sage and grasses. Prior to inundation, sagebrush and bunch grasses grew on both sites. Ponderosa pines now grow within the drainage and beside it, as well as on the higher terraces. A sagebrush-grass association (Artemisia tridentata-Agropyron) (Daubenmire 1970), typical of the Upper Sonoran life zone (Piper 1906), characterizes the vegetation in the site area. Introduced plants include cheatgrass (Bromus tectorum), Russian thistle (Salsola kali), and thistle (Cirsium spp.) among others. Scattered sagebrush and rabbit brush (Chrysothamnus nauseosus), and a dense understory of grasses along with an abundance of spring flowers grow on the site. A more mesic association including rose (Rosa sp.), serviceberry (Amelanchier sp.), horsetail (Equisetum ssp.), tule (Scirpus acutus), and sedges (Carex spp.) grows in nearby drainages.

On the upper terraces above the river, Artemisia rigida replaces big sagebrush in areas of thinner, rocky soils. Bitterbrush (Purshia tridentata) and isolated pines (Pinus ponderosa), with an understory of grasses, grow along the steep draws draining the slopes and terraces. To the south, across the river, scattered pines give way to sagebrush covered uplands dotted with small lakes and springs. To the north, mixed Douglas fir (Pseudotsuga menziesii) and pine are dominant in moister bottomlands and along streams,

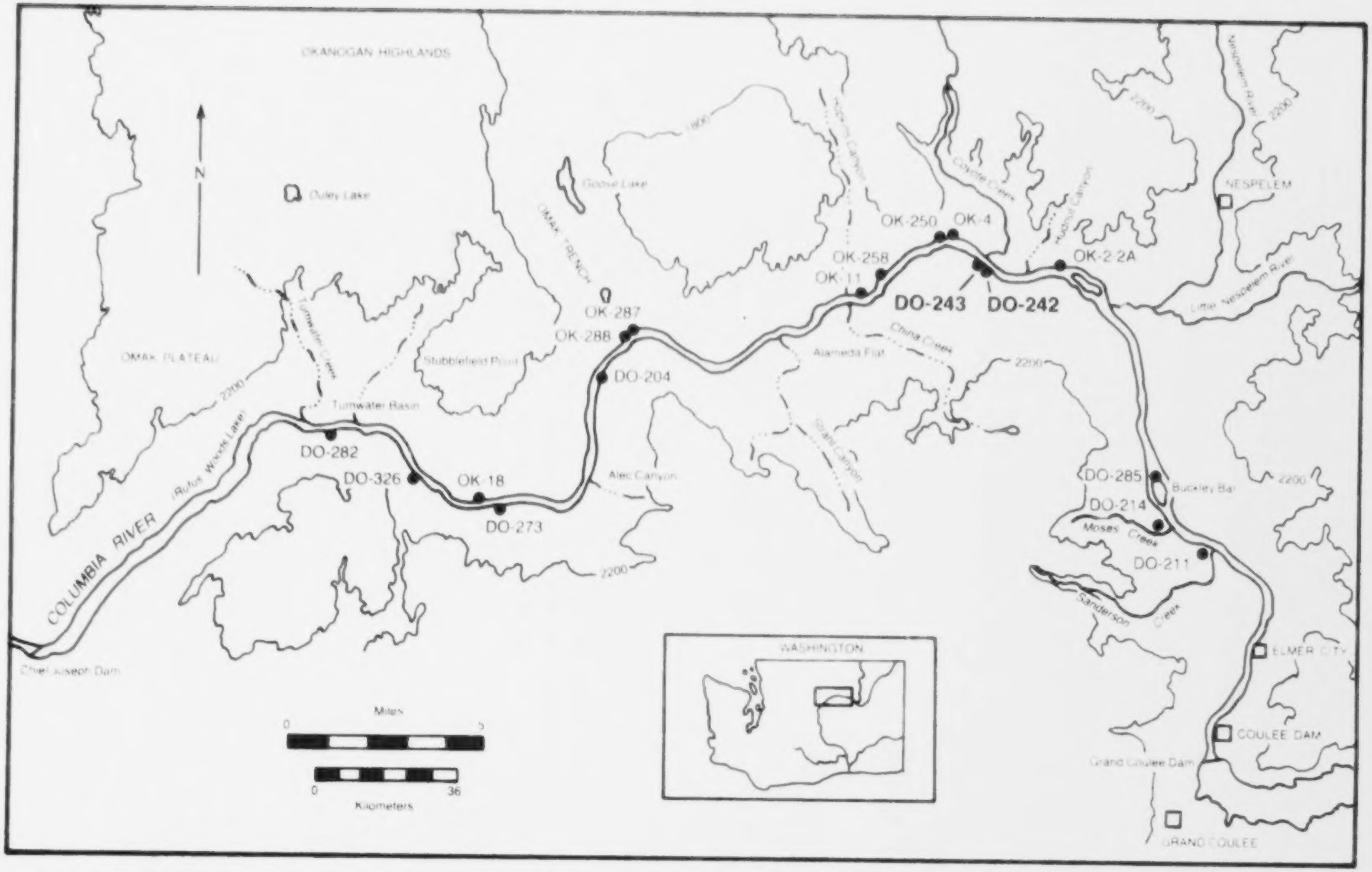

OKANOGAN HIGHLANDS
OMAK PLATEAU
N
Duley Lake
Goose Lake
OMAK TRENCH
1800
2200
Tunwater Creek
Tunwater Basin
Stubblefield Point
Hopkins Canyon
Coyote Creek
Hudnut Canyon
Nespelem River
NESPELEM
Little Nespelem River
Alameda Flat
China Creek
Strahl Canyon
Alec Canyon
COLUMBIA RIVER
(Rufus Woods Lake)
Chief Joseph Dam
OK-287
OK-288
DO-204
DO-282
DO-326
OK-18
DO-273
OK-11
OK-258
OK-250
OK-4
DO-243
DO-242
OK-2.2A
DO-285
Buckley Bar
DO-214
Moses Creek
DO-211
Sanderson Creek
ELMER CITY
COULEE DAM
Grand Coulee Dam
GRAND COULEE
WASHINGTON
Miles
0
5
0
36
Kilometers

Figure 1-1. Plan map of project area showing location of 45-DO-242 and 45-DO-243.

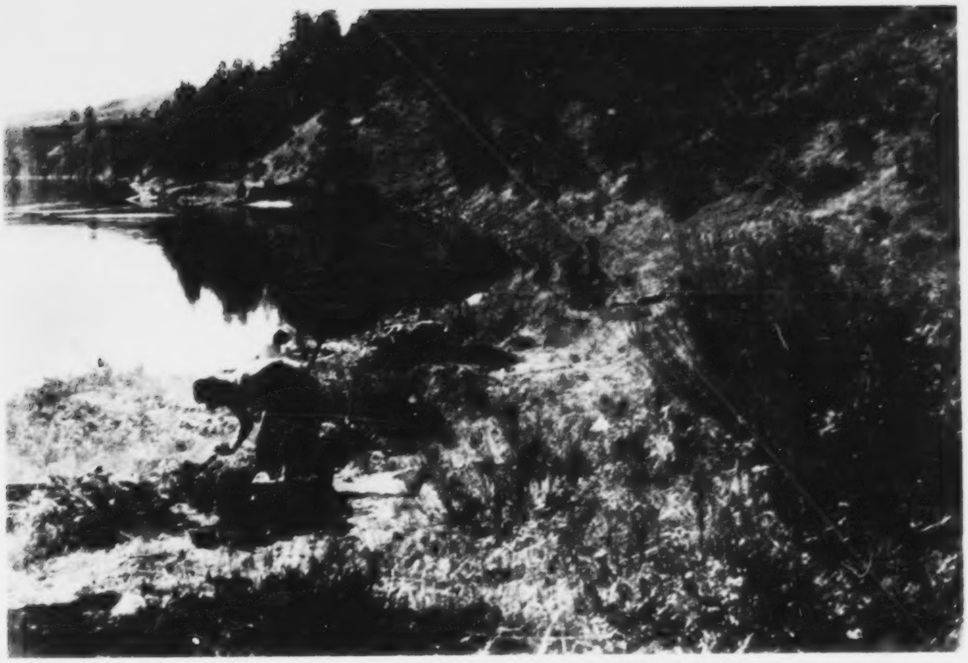


Plate 1-1. View to the east (upriver), 45-DO-242.

Plate 1-2. View to the northeast (upriver), 45-DO-243. Picture taken from terrace above site.

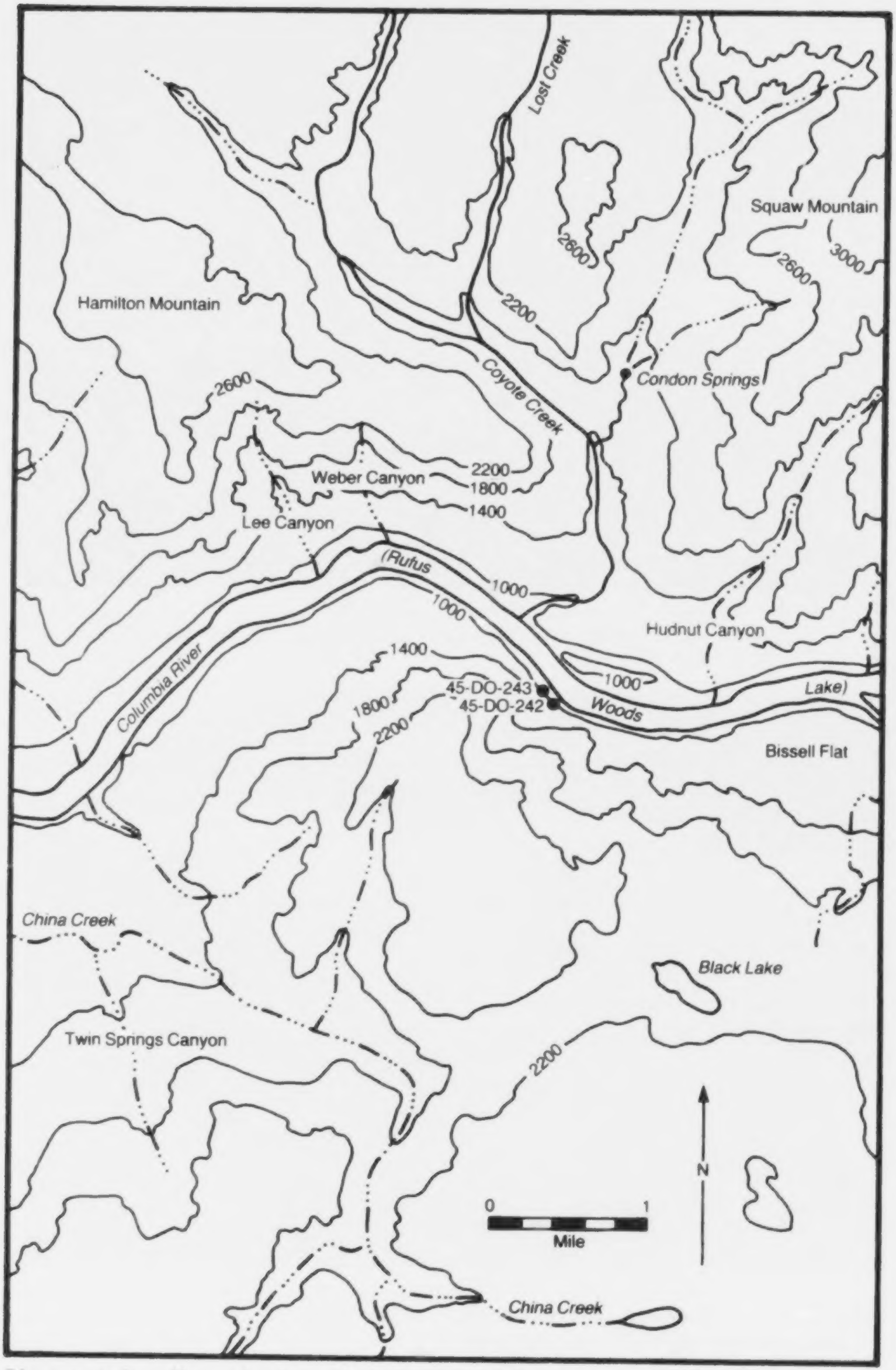

Lost Creek
Squaw Mountain
2600
3000
2600
Hamilton Mountain
2200
Condon Springs
Coyote Creek
2600
2200
1800
1400
Weber Canyon
Lee Canyon
(Rufus
1000
1000
Hudnut Canyon
Columbia River
1400
1000
45-DO-243
45-DO-242
Woods
Lake)
1800
2200
Bissell Flat
China Creek
Black Lake
Twin Springs Canyon
2200
N
0
1
Mile
China Creek

Figure 1-2. Map of site vicinity, 45-DO-242 and 45-DO-243.

where they grow with broadleaf trees and shrubs. At the highest elevations, the fir forest gives way to pine forest, except on north-facing slopes and valley floors, where the dominant species is still Douglas fir with larch (Larix occidentalis) and some spruce (Picea engelmannii) and an associated understory of woody shrubs.

45-DO-242 and 45-DO-243 are favorably located. The site inhabitants would have had a dependable water source and easy access to the Plateau uplands. They could exploit a wide variety of game and wild plants. Seeds and roots could be gathered from spring through fall. Large game species like elk and deer ranged between upland and river. Smaller species were restricted in range to specific vegetation communities and water sources. Migratory waterfowl were plentiful along rivers, streams and lake margins during the spring and fall. The river yielded suckers and freshwater mussels, as well as salmon during spring, summer, and fall runs. Site inhabitants could have exploited any of these species, scheduling their visits or activities to coincide with the availability of specific resources. These sites also might have served as more permanent bases where people lived for much of the year, travelling out to hunt and gather food stuffs.

INVESTIGATIONS AT 45-DO-242 AND 45-DO-243

Site 45-DO-242 was excavated during the 1979 field season, with work beginning on 16 May 1979 and ending on 14 August 1979. It was selected for investigation because testing in the spring of 1978 had yielded evidence of at least three cultural occupations. Thus the site promised to shed light on changing cultural patterns of prehistoric peoples in the project area. The retrieval of a radiocarbon date of 738±67 B.P. (TX-3131) from the uppermost cultural occupation generated yet more interest. As this date placed the site in Rufus Woods Lake Period VI (1500-250 B.P.), a period not well represented in prior testing and excavation assemblages, 45-DO-242 was immediately placed on the priority list for excavation.

Site 45-DO-243 also was excavated during the 1979 field season, with work beginning on 28 June 1979 and ending on 24 August 1979. This site was selected because testing in the spring of 1978 had yielded evidence of at least two cultural occupations. Two small projectile points classified as Rabbit Island Stemmed were recovered from the more recent occupation, which was therefore assigned to RWL IV (3500-2500 B.P.). The apparent age of the site's cultural deposits and its potential for yielding a wide range of habitation features argued for more intensive investigation.

Because they were separated by a deep draw and differed in cultural stratigraphy, the two sites were excavated separately. 45-DO-242 held a greater range and number of cultural features than 45-DO-243. Available dates revealed a gap of almost two thousand years between the abandonment of 45-DO-243 and the latest occupation of 45-DO-242.

Excavation of 45-DO-242 was conducted within a stratified unaligned systematic random sampling design (Figure 1-3). Individual sampling strata consisted of contiguous sets of 25 2 x 2-m grid units arranged in square quadrat arrays. These excavation units were randomly selected within each 10

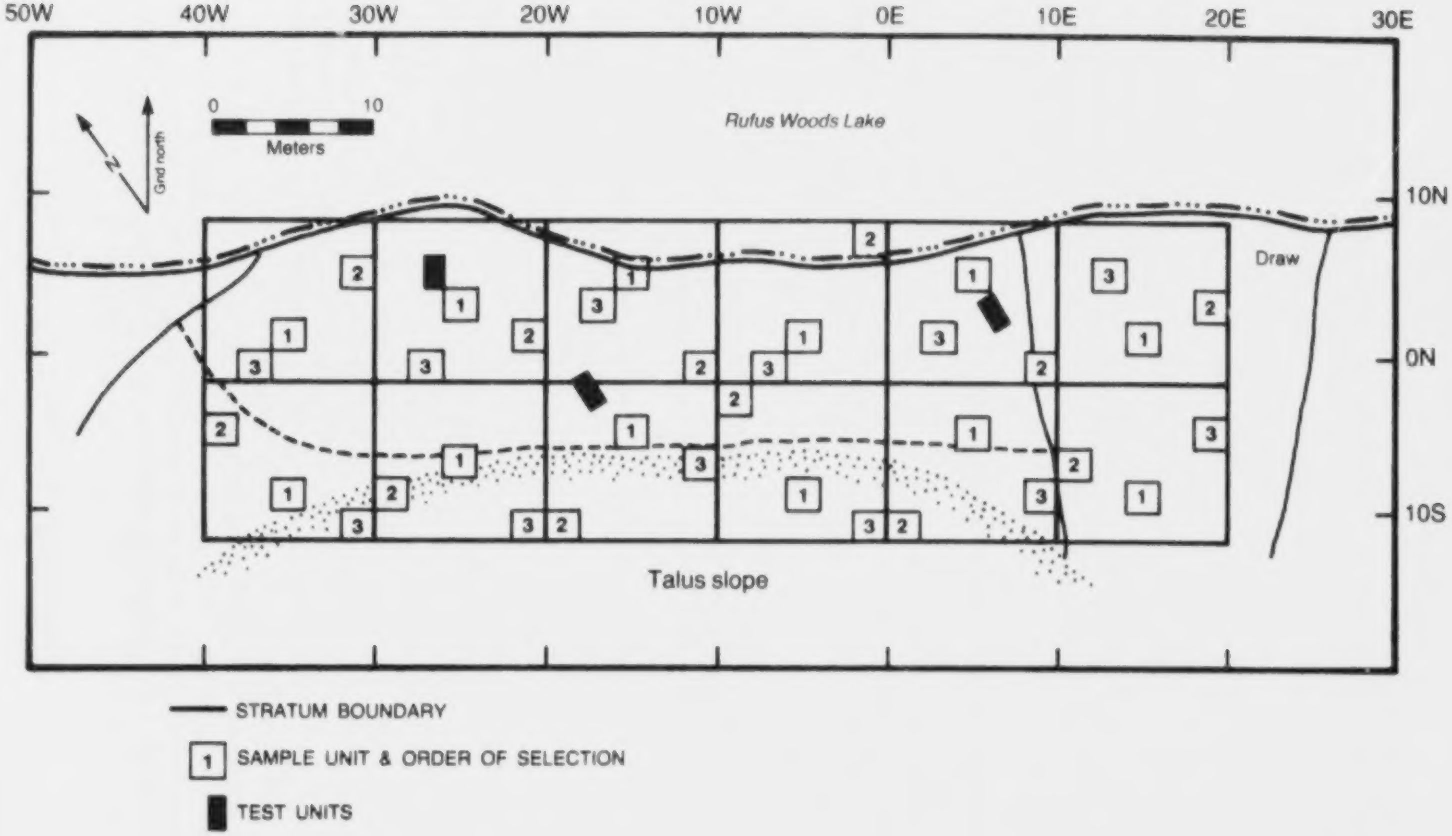

50W
40W
30W
20W
10W
0E
10E
20E
30E
10N
0N
10S
Gnd north
N
0
10
Meters
Rufus Woods Lake
Draw
Talus slope
1
2
3
STRATUM BOUNDARY
SAMPLE UNIT & ORDER OF SELECTION
TEST UNITS

Figure 1-3. Sampling plan, 45-DO-242.

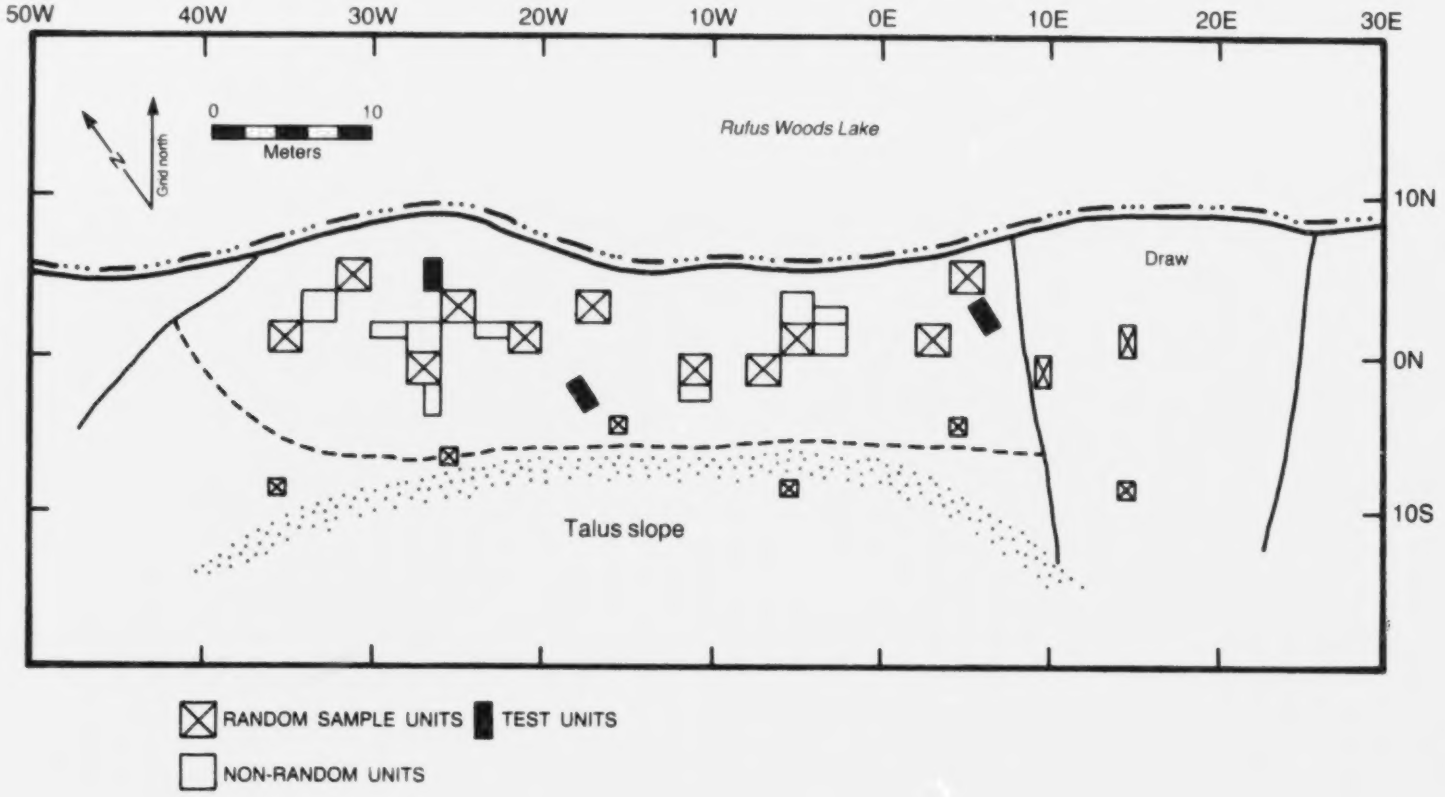
x 10-m stratum. The sampling process was designed to determine the range of cultural features at the site and thereby enable the excavators to assess the need for purposively placed units.

Two different unit sizes were used. Along the southern part of the site, as a consequence of sparse deposits at the toe of the talus slope, a smaller, 1 x 1-m unit was excavated in each sampling stratum (Figure 1-4). Both 1 x 1-m and 2 x 2-m excavation units were used over most of the site area. Except at the extreme northeast end of the site, at least two units were excavated for each sampling stratum. With the discovery of two housepits in the northern part of the site, purposive units were introduced to insure a more complete excavation of these features. For the western housepit, the three probabilistic units in the stratum were connected with purposive units to expose the living floor more fully. A similar strategy was used for the eastern housepit. Excavators also dug a single 1 x 1-m unit in the center of a large pit feature in the approximate center of the site. In all, they dug 31 units, covering an area of 80 m^2, and producing a total excavated volume of about 128 m^3.

Excavation at 45-DO-243 also was conducted within a stratified unaligned systematic random sampling design, wherein sampling strata were to consist of contiguous sets of 25 2 x 2-m grid units placed in square quadrat arrays (Figure 1-5). Field conditions, however, required that this ideal design be modified. It was discovered that 23 of the proposed 48 sample units were either located in rocky, non-site terrain or were situated too close to the rising water of the reservoir. For the purposes of the excavation design, these units were considered excavated, and without cultural deposits. The other units were dug (Figure 1-6). Purposive excavation units were not added since the site had few cultural features and low densities of artifacts. A total of 25 1 x 2-m units were dug, covering an area of 50 square meters, and producing a volume of about 85 m^3.

Excavation at 45-DO-242 exposed 28 cultural features spread out through four distinct cultural zones: three pit houses, seven open firepits, eight other pits, four bone concentrations, four lithic concentrations and two shell concentrations. Six radiocarbon dates document occupations from at least 3900 to 200 B.P. The artifact assemblage is large and varied, totalling 7,272 lithic artifacts, 58,429 whole and fragmented pieces of bone, 5,928 pieces of shell, and 2,253 fire-modified rocks. Among the artifacts are 520 worn and manufactured objects encompassing a broad range of lithic and nonlithic tools.

Excavation at 45-DO-243 exposed seven cultural features occurring throughout four cultural zones: a possible pit house, a roasting pit, an open firepit and four shell concentations. A single radiocarbon date from an upper zone suggests at least one occupation at about 1500 B.P. Excavators recovered 2,557 lithic artifacts, 6,494 whole and fragmented pieces of bone, 1,322 pieces of shell and 29 fire-modified rocks. Of the lithic artifacts, 138 were worn and manufactured. The artifact assemblage was much less varied than that of 45-DO-242.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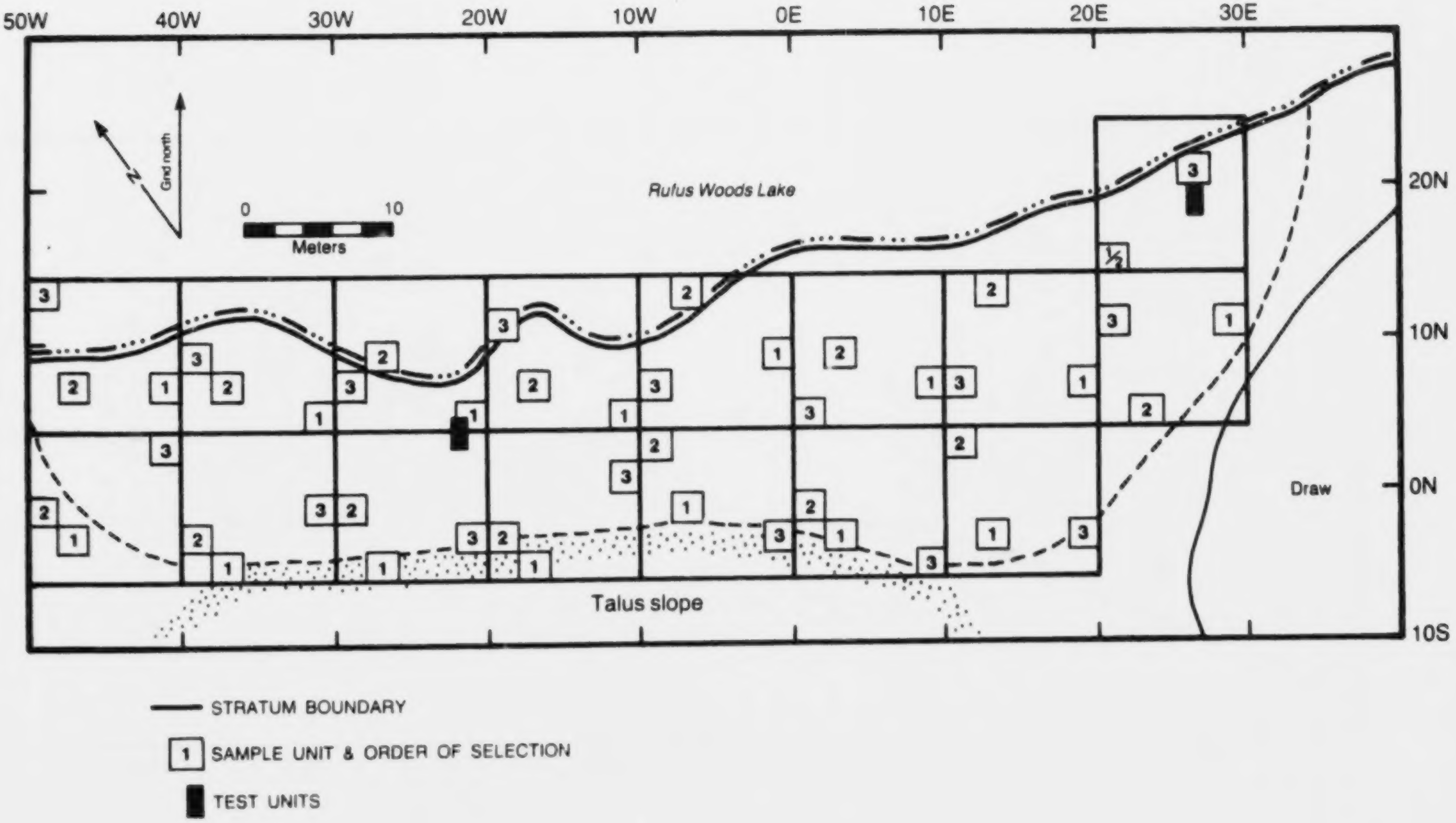
Draw
Talus slope
RANDOM SAMPLE UNITS
TEST UNITS
NON-RANDOM UNITS

Figure 1-4. Excavated units, 45-DO-242.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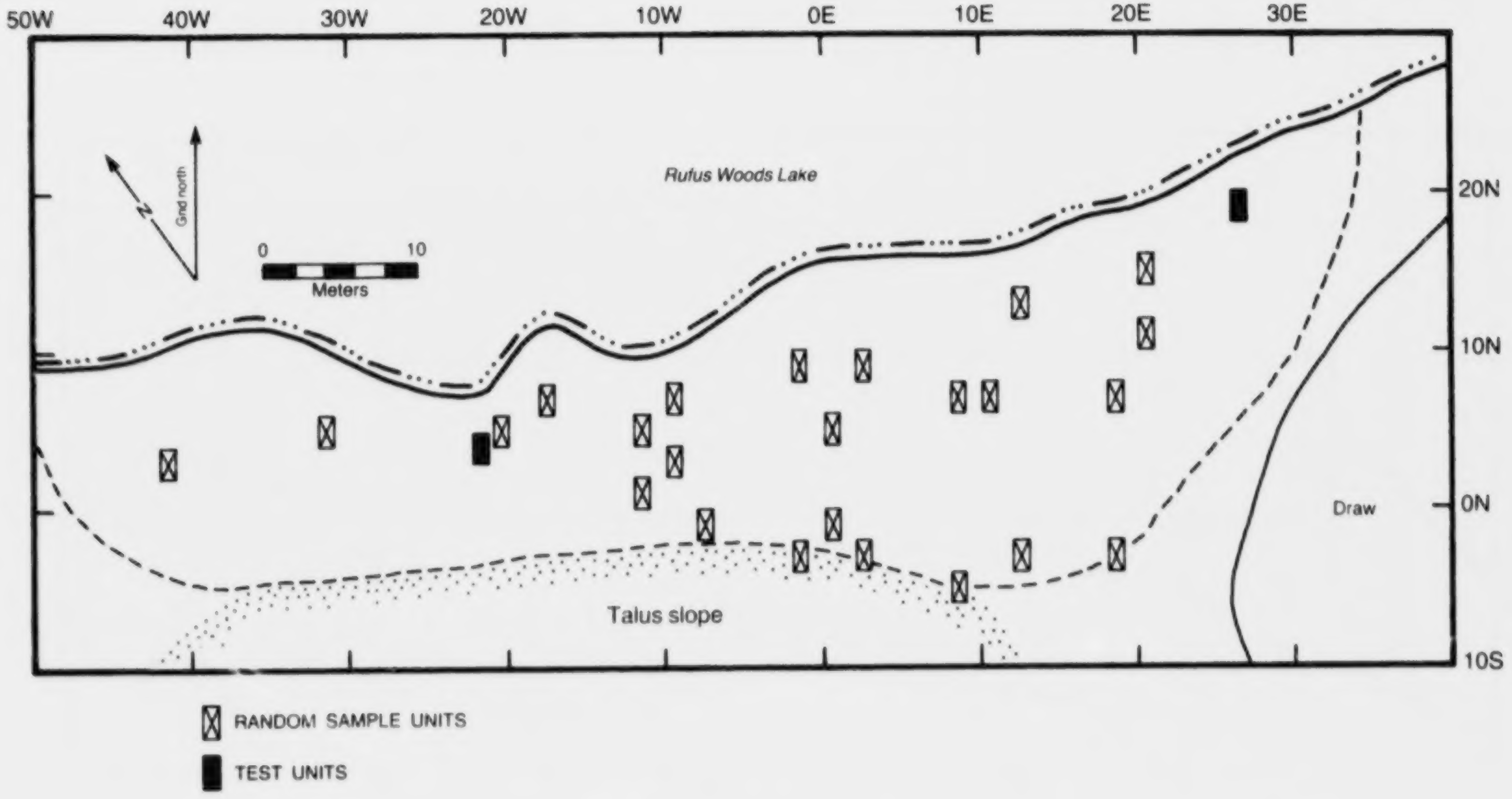
Draw
Talus slope
STRATUM BOUNDARY
SAMPLE UNIT & ORDER OF SELECTION
TEST UNITS

Figure 1-5. Sampling plan, 45-DO-243.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Meters
Rufus Woods Lake
Draw
Talus slope
☒ RANDOM SAMPLE UNITS
■ TEST UNITS

Figure 1-6. Excavated units, 45-DO-243.

REPORT FORMAT

The following chapters present the results of investigations at 45-DO-242 and 45-DO-243. Owing to their physical proximity and the fact that the same research procedures were applied to each site, they are discussed together. Chapter 2, Natural and Cultural Stratigraphy, describes the geologic setting of the two sites, defines the basic depositional units, and relates these to cultural units or analytic zones. Chapter 3, Artifact Analyse, gives the results of the three kinds of analyses--technological, functional and stylistic--that were applied to the artifacts. Chapter 4, Faunal Analysis, describes the faunal remains recovered from the sites; discusses their meaning in terms of subsistence patterns of the sites' occupants; and makes inferences from the remains about the seasonality of occupations at the sites. Chapter 5, Features Analysis, describes the artifact associations and physical boundaries defined in the field as cultural features. Chapter 6, Synthesis, summarizes the sites' cultural deposits; makes inferences from them concerning the nature and chronology of their occupations; and then places these findings in the context of the region's previous archaeology.

2. NATURAL AND CULTURAL STRATIGRAPHY

This section discusses the geologic setting of sites 45-DO-242 and 45-DO-243 with reference to local geologic history and describes the sedimentary history of the sites themselves in detail. Strata mapped during excavation are grouped into sitewide depositional units, which provide the basis for determining how deposition occurred and for correlating cultural materials among units. The second half of the chapter discusses the cultural strata or analytic zones defined within this framework.

GEOLOGIC SETTING

Sites 45-DO-242 and 45-DO-243 are in the upper canyon of the project area. Here, the Columbia River flows along the eastern margin of the Waterville Plateau where the Columbia River Basalts contact the granitic rocks of the Colville Batholith. It is believed the river has flowed along the margin of the Plateau since the late Miocene outpouring of basalts. During the Pleistocene the middle and northern reaches of the Columbia River drainage were overlain by ice sheets. The Okanogan Lobe of the Cordilleran ice sheet entirely filled the upper canyon to the Grand Coulee, reaching its maximum extent between 13,000 and 14,500 B.P. The ice wasted away earlier in the upper canyon than in the lower canyon. As a consequence, river waters ponded behind the ice dam, and the upper canyon was filled with a thick profile of glaciolacustrine sediments. When the ice dam in the lower canyon was finally breached, the Columbia River rapidly downcut through the lacustrine sediments with occasional stillstands, creating a deep, narrow valley with a prominent terrace system. Mazama tephra Layer O has been observed in alluvial fans built on to the 1000 ft terrace (Hibbert 1984), indicating that the river reached this elevation before 7000 B.P., and probably reached historic elevations shortly thereafter.

The rapid, postglacial downcutting of the Columbia River left a deep canyon characterized by a well-developed terrace system and narrow channel, occurring entirely in bedrock. Depositional and erosional processes responsible for altering the landscape since this time include lateral migration, point bar, and overbank deposition of the Columbia River, alluvial fan development, colluvial deposition, and aeolian deposition. Little floodplain development has taken place in this narrow valley, but natural levees and abandoned channels can be recognized in some areas. Surfaces less than 20 m above the historic river levels commonly exhibit overbank deposits. While this stretch of the river is characterized by comparatively little meandering, local lateral migrations are recorded by the shape of the river, point bar formation, and erosional episodes in site profiles. Alluvial fans have been built on the terraces at the mouths of tributary canyons. Few permanent drainages occur in the project area: most drainage is intermittent and unintegrated. Talus slopes are common at the base of both granitic and basaltic bedrock formations. Erosion and colluvial redeposition of the thick glaciolacustrine sediments in the upper canyon is common. This may take the form of major landslides or small deposits. Aeolian deposits cover the surface of all but the youngest landforms.

Sites 45-DO-242 and 45-DO-243 are located at the river margin of an alluvial fan at the base of a shallow draw upstream from River Mile 579. The terrace system created by postglacial downcutting through glaciolacustrine sediments is apparent on the opposite side of the river and downstream, where terraces cut into Nespelem silt are capped by Columbia River gravels. In the immediate vicinity of the site, however, the glaciolacustrine sediments have been eroded down to the present river level, revealing outcrops of the granitic rocks of the Colville Batholith. Although there is no prominent, gravel-capped terrace mapped in the site area, the basal deposit found in our excavations is Columbia River gravels, consisting of rounded basaltic and granitic cobbles, pebbles, and gravel. Ephemeral streams draining the slopes above the site have deposited alluvium on this surface: the surficial deposit mapped in the site area is alluvial fan and mud slide deposits (Figure 2-1).

Fans are generally fan-shaped in plan view and best described morphologically as a segment of a cone radiating away from a single point source. This fan, however, is not particularly well developed because the adjacent basin was subject to river fluctuations. Field observations indicate that it is actually a series of micro-alluvial fans which have coalesced. Each fan would have grown at different rates, depending on ephemeral stream water discharge and sediment load. It is quite common for adjacent fans to merge at their lateral extremities; the individual cone shape is lost, and a rather nondescript deposit is formed. These coalesced fans are commonly referred to as bajadas, alluvial aprons, or alluvial slopes (Ritter 1982:278). Due to bank erosion in historic times, it is impossible to determine whether the fans were ever cone-shaped or always apron-shaped as they are today. What is apparent is that by 4,000 or 5,000 years B.P. the heavy precipitation that cut the stream draws had lessened and the fan became stable enough for human occupation. The fan has been cut and narrowed by the rising of the Columbia River after the construction of Chief Joseph Dam.

PROCEDURES

In 1979, from June through August, the stratigraphic crew mapped 165 linear meters from 27 excavated units at 45-DO-242. A minimum of two walls was mapped in each 1 x 1-m and 1 x 2-m unit and all four walls were mapped in each 2 x 2-m unit. In addition, 16 m of the river bank were profiled. Four excavation units were selected for column sediment sampling. They were chosen from spatially representative areas that exhibited a major portion of the cultural and natural depositional sequences (Figure 2-2).

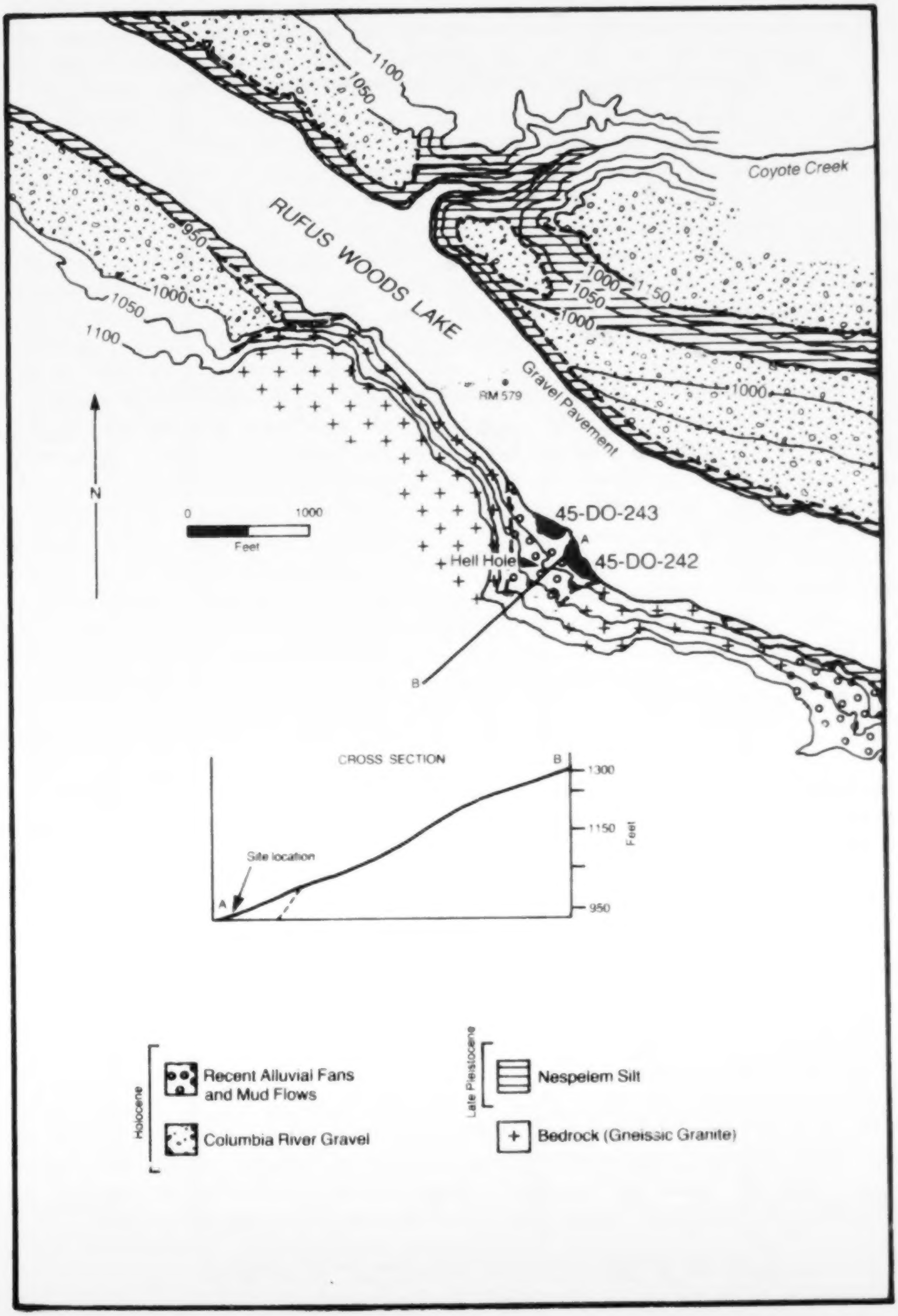
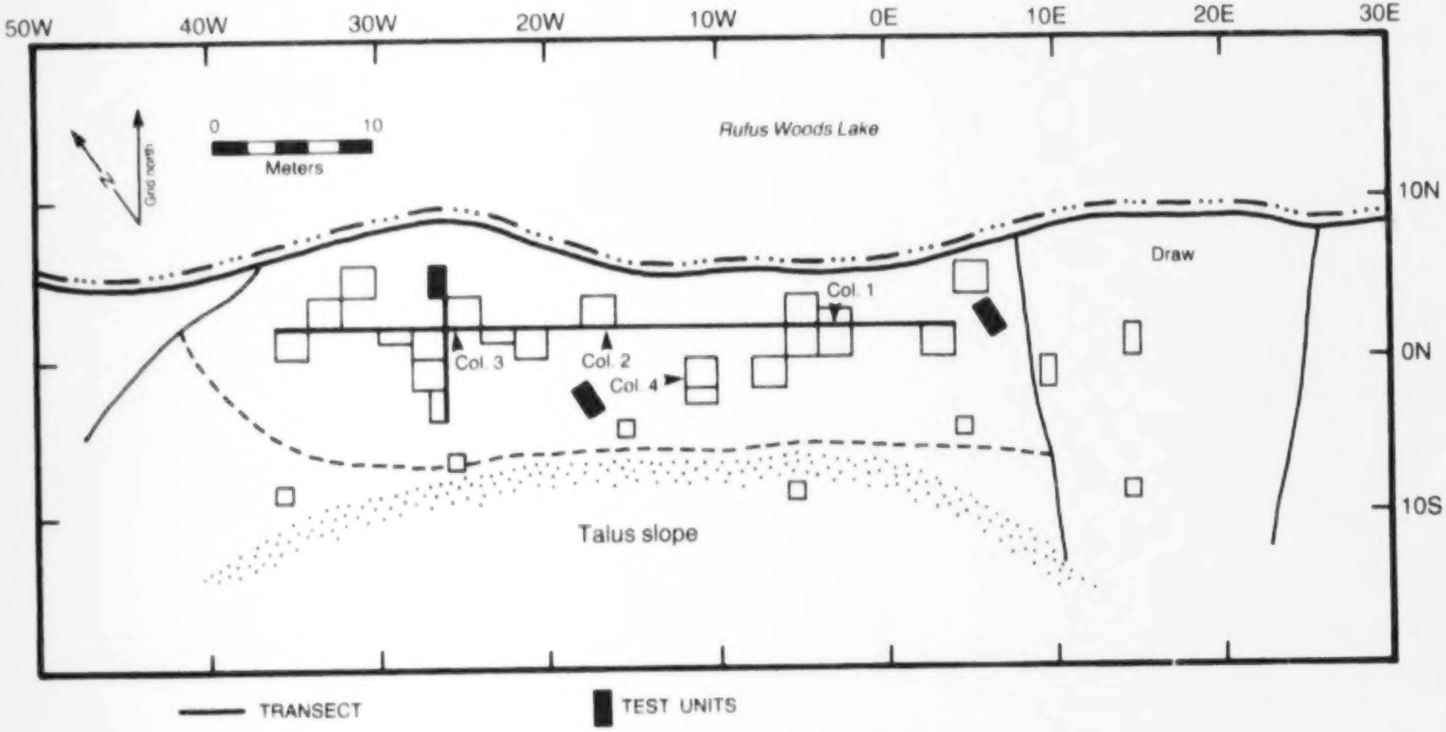

RUFUS WOODS LAKE
Coyote Creek
Gravel Pavement
RM 579
Hell Hole
45-DO-243
45-DO-242
A
B
1100
1050
1000
950
1150
N
0
1000
Feet
CROSS SECTION
Site location
1300
1150
950
Feet
Holocene
Recent Alluvial Fans and Mud Flows
Columbia River Gravel
Late Pleistocene
Nespelem Silt
Bedrock (Gneissic Granite)

Figure 2-1. Geologic map of site vicinity, 45-DO-242 and 45-DO-243.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Meters
Rufus Woods Lake
Draw
Col. 1
Col. 2
Col. 3
Col. 4
Talus slope
TRANSECT
TEST UNITS

Figure 2-2. Location of column samples and transects, 45-DO-242.

Seventy-five linear meters of profiles, including at least two walls from every excavation unit were drawn at 45-DO-243 September 1979. Figure 2-3 shows the location of the three units selected for column sampling.

Wall collapse created problems for stratigraphic profiling. The unconsolidated alluvial sands over the cobble layer proved unstable when they dried after exposure. The overlying strata collapsed along several meters of wall before profiling was completed. However, at least two walls from every unit were available for profile recording.

The stratigraphic crew examined the deeply cut stream banks which border 45-DO-242 to east and west, and 45-DO-243 to the east. Deposits of an unidentified tephra as well as shell were observed in the bank, particularly to site grid east. Shovel test holes on the terrace above the site revealed a tephra deposit of 30 cm to 60 cm in thickness but no additional shell or other cultural material was uncovered.

Based upon study of field profile descriptions and physical and chemical analyses, we have grouped the strata mapped during excavation into sitewide depositional units. We have used the stratigraphic boundaries as temporal markers to aid us in subdividing the cultural deposits for analyses. The horizontal and vertical distribution of artifacts by quad and level was compared with the natural depositional sequence and feature boundaries. Those stratigraphic units containing a discrete cultural deposit were defined as analytic zones. Radiocarbon dates and diagnostic feature types were used to check our determinations. Additional information on the methods and procedures used in stratigraphic analysis and definition of zones can be found in the project's research design (Campbell 1984d).

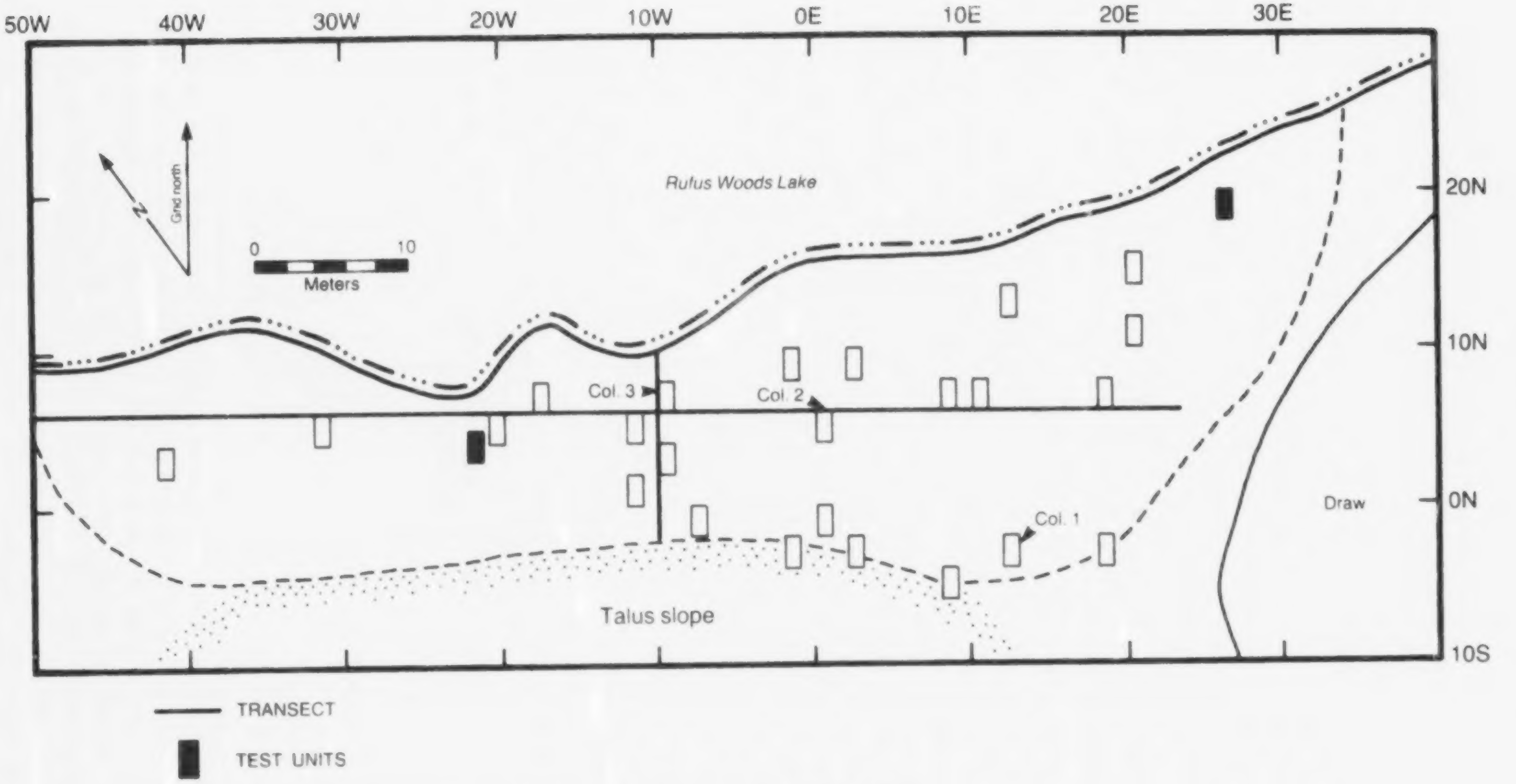
DEPOSITIONAL HISTORY

Although different numbers of sitewide strata could be distinguished at 45-DO-242 (7) and at 45-DO-243 (12), it was possible to relate them to a sequence of three depositional units which apply to both sites. Morphological descriptions of each stratum can be found in Tables 2-1 and 2-2. Stratigraphic transects across 45-DO-242 are shown in Figure 2-4, and a more detailed east-west profile in Figure 2-5. Figure 2-6 presents stratigraphic transects across 45-DO-243.

DU I -- Lower Bar Deposit

The oldest deposit encountered is the river-rounded basal sediment of coarse sand material with gravel, pebbles and cobbles. The deposit delineates the southern meander of the river in this area which occurred prior to occupation. Stratigraphic evidence suggests that the river boundary reached the southern slope before the alluvial fan began forming. As the stratigraphic transects (Figure 2-4 and 2-6) show, the topography of the basal gravel and cobble layer differs from that of the present surface.

The laminated bands of sand and silt-sized sediments found within and overlying the pebbles and cobbles are viewed as a result of the same depositional episode. In structure, size and composition these sediments are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20E
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Grid north
N
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10
Meters
Rufus Woods Lake
Col. 3
Col. 2
Col. 1
Draw
Talus slope
TRANSECT
TEST UNITS

Figure 2-3. Location of column samples and transects, 45-DO-243.

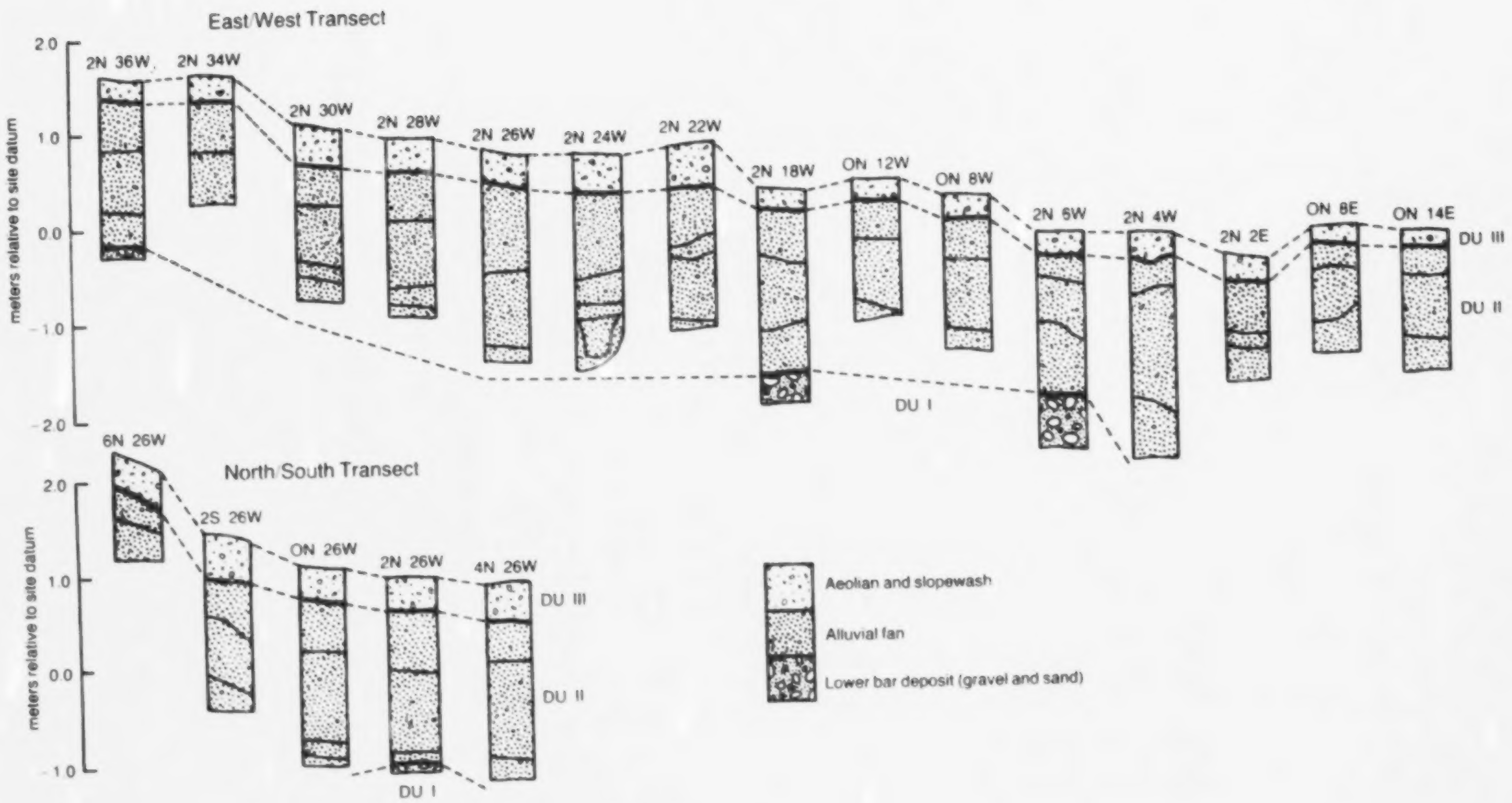
East/West Transect
meters relative to site datum
2.0
1.0
0.0
-1.0
-2.0
2N 36W
2N 34W
2N 30W
2N 28W
2N 26W
2N 24W
2N 22W
2N 18W
ON 12W
ON 8W
2N 6W
2N 4W
2N 2E
ON 8E
ON 14E
DU III
DU II
DU I
North/South Transect
meters relative to site datum
2.0
1.0
0.0
-1.0
6N 26W
2S 26W
ON 26W
2N 26W
4N 26W
DU III
DU II
DU I
Aeolian and slopewash
Alluvial fan
Lower bar deposit (gravel and sand)

Figure 2-4. Stratigraphic transects, 45-DO-242.

Field Stratum	Grouped Strata	DESCRIPTION
A	100	Brown [10YR5/3] sandy loam, coarse blocky structure, soft consistence, moderately to poorly sorted. Grasses, twigs, roots. Boundary clear/wavy.
I	100	Greyish brown [10YR5/2] loamy sand, blocky structure, soft consistence, poorly sorted. Roots, occasional fine gravel. Boundary clear/wavy.
II	100	Light grey [10YR7/2] fine to medium sand, medium blocky structure, soft consistence, moderately well sorted. More compact than Stratum I. Boundary abrupt, irregular/broken, very disturbed.
III	100	Broken [10YR5/3] fine to medium sand, medium blocky structure, soft consistence, moderately sorted. Shell, charcoal, roots, occasional fine to coarse gravel. Boundary gradual/wavy.
IV	200	Brown [10YR5/3] slightly lighter than Stratum III, fine to medium sand, medium blocky structure, soft consistence, moderately sorted. Shell, bone charcoal, occasional coarse gravel, and pebbles. Boundary gradual/wavy.
V/VI	400	Pale brown [10YR6/3] medium sand, fine blocky structure, soft consistence, moderately well sorted. Occasional fine to coarse gravel, charcoal. Boundary wavy/diffuse to clear.
VIII	500	Very pale brown [10YR7/4] fine to medium sand, coarse blocky structure, hard consistence, weakly cemented, moderately well sorted. Abundant medium and coarse gravel and pebbles. Boundary clear/wavy.
X	600	Pale brown [10YR6/3] coarse and medium sand, slightly hard consistence, very weakly cemented, moderately well sorted. Occasional fine to coarse gravel. Boundary clear to gradual/wavy.
XI	700	Salt and pepper sand, coarse and medium. Single grain structure, loose consistence, moderately well sorted. Some medium and coarse gravel. Boundary unknown.

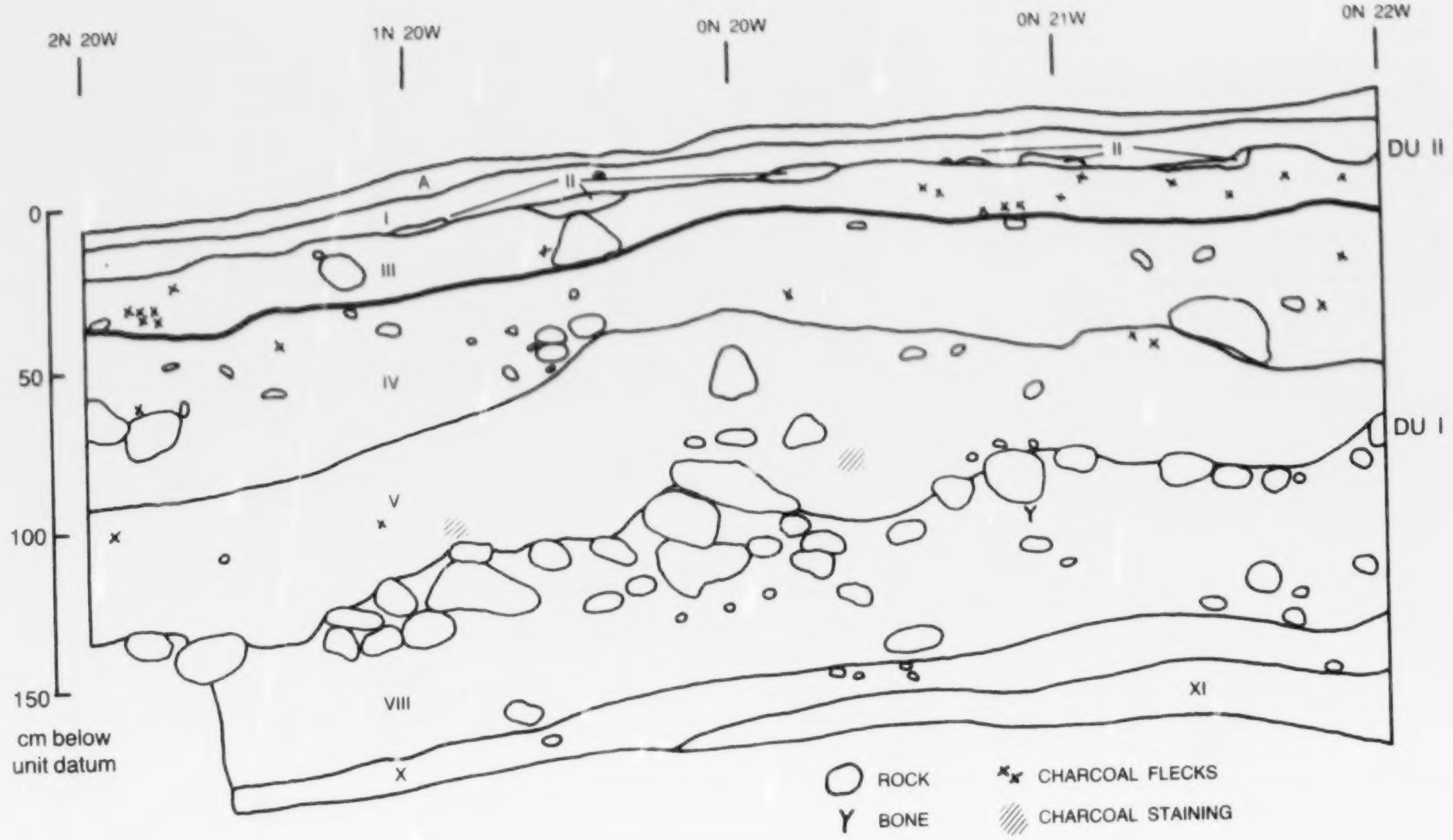
2N 20W
1N 20W
0N 20W
0N 21W
0N 22W
DU II
DU I
A
I
II
III
IV
V
VIII
X
XI
0
50
100
150
cm below unit datum
ROCK
BONE
CHARCOAL FLECKS
CHARCOAL STAINING

Figure 2-5. Detailed profile at 2N, 45-DO-242.

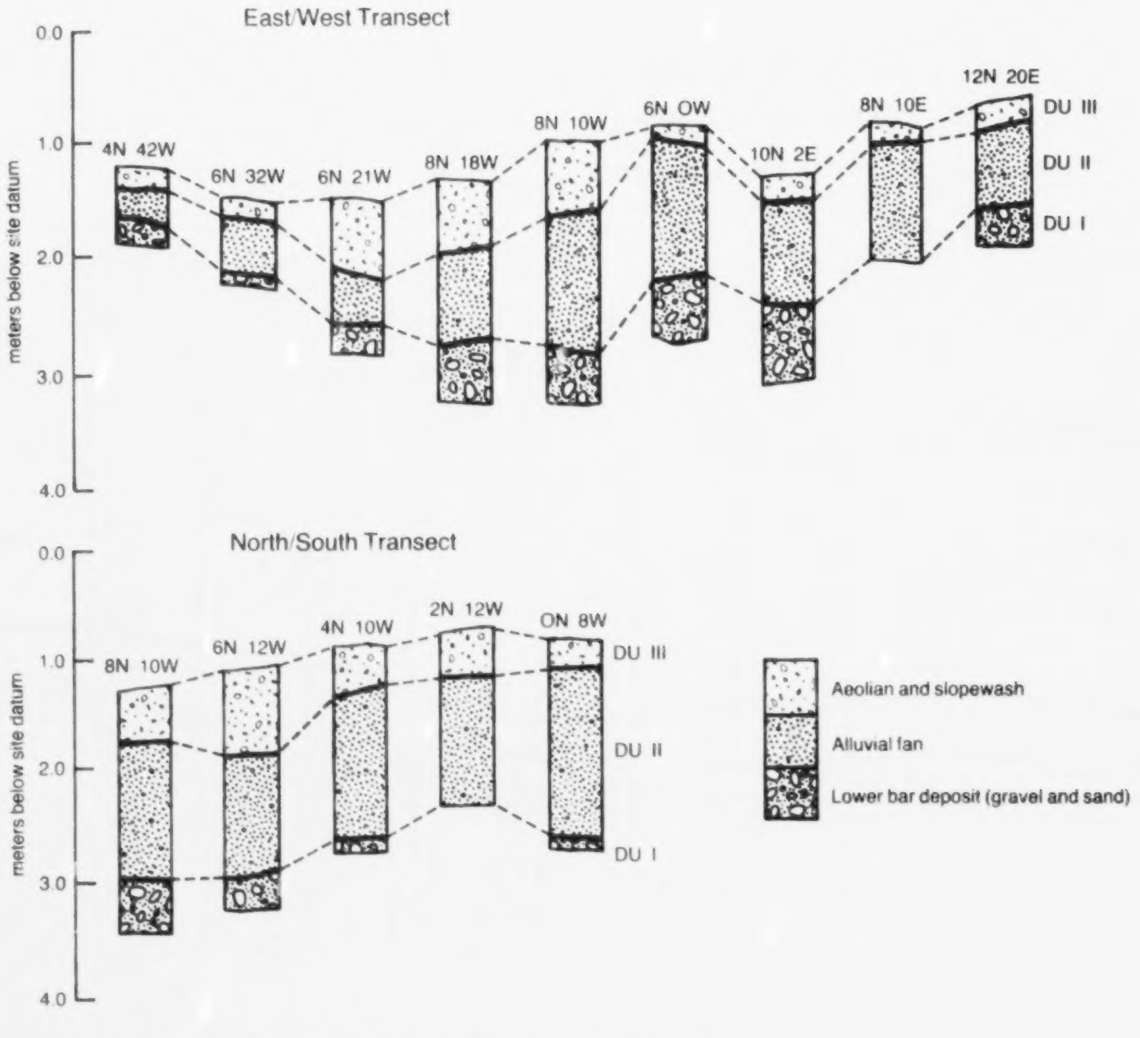
East/West Transect
0.0
1.0
2.0
3.0
4.0
meters below site datum
4N 42W
6N 32W
6N 21W
8N 18W
8N 10W
6N OW
10N 2E
8N 10E
12N 20E
DU III
DU II
DU I
North/South Transect
0.0
1.0
2.0
3.0
4.0
meters below site datum
8N 10W
6N 12W
4N 10W
2N 12W
ON 8W
DU III
DU II
DU I
Aeolian and slopewash
Alluvial fan
Lower bar deposit (gravel and sand)

Figure 2-6. Stratigraphic transects, 45-DO-243.

Table 2-1. Morphological descriptions of combined strata at 45-DO-242.

DU[1]	Stratum	Color		Texture	Consistence	pH	Comments
		Moist	Dry				
III	100	Brown (10YR 5/3)	Pale brown (10YR 6/3)	Loamy sand to sandy loam	Loose (moist)	6.1-7.4	Consists of surface organic litter mat. Predominantly aeolian material. Poorly sorted. Contains scattered evidence of latest occupation. Blocky structure near surface, medium granular at base. Angular/subangular gravel and pebble-sized sediments. Boundary: clear to gradual, smooth.
II	200	Brown (10YR 5/3)	Light yellowish brown (10YR 6/4)	Sand to loamy sand	Firm (moist)	6.6-8.0	Increase in slope wash and alluvial fan sediments. Poorly sorted, medium to fine granular structure. More cultural debris. Subangular to subrounded grains. Boundary: clear to gradual, smooth to wavy.
	300	Pale brown (10YR 6/3)	Pale brown (10YR 6/3)	Sand to loamy sand	Soft (dry)	7.0-8.0	Not a sitewide stratum, similar to 400. Moderately well sorted, fine blocky structue. Mixed slope wash and alluvial fan material. Subangular to subrounded grains. Boundary: diffuse, smooth.
	400	Pale brown (10YR 6/3)	Grayish brown (10YR 5/2)	Loamy sand	Soft (dry)	7.0-8.5	Alluvial fan material. Moderately well sorted with some fine, subangular gravel. Blocky structure high in cultural debris. Boundary: abrupt to clear, smooth to irregular.
	500	Brown (10YR 5/3)	Pale brown (10YR 6/3)	Loamy sand	Firm (moist)	7.5-8.5	Alluvial fan sediments altered by heavy cultural activity. Not sitewide cultural evidence. Similar attributes to grains in stratum 400. Boundary: abrupt, wavy to irregular.
	600	Pale brown (10YR 6/3)	Very pale brown (10YR 7/4)	Sand to loamy sand	Slightly hard, weakly cemented	7.4-7.8	Predominantly slope wash, alluvium and colluvium. Mixture of angular to subrounded grains with gravel, pebbles and cobbles. Boundary: clear, wavy.
I	700	Pale brown (10YR 6/3) (predominantly salt and pepper)	Very pale brown (10YR 7/4)	Sand to loamy sand sand	Soft/loose (dry)	6.7-8.0	Basal river channel deposit with rounded to subrounded grains and gravel, pebbles and cobbles. Unconsolidated single grain structure.

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[1] Depositional unit

Table 2-2. Morphological descriptions of combined strata at site 45-DO-243.

DU[1]	Stratum	Color		Texture	Consistence	pH	Comments
		Moist	Dry				
III	100	Brown to pale brown (10YR 5/3-6/3)	Brown to yellowish brown (10YR 5/3-5/4)	Loamy sand	Soft (dry)	6.7-7.4	Consists of surface litter mat and wind-modified alluvium. Boundary: abrupt to gradual, smooth.
	110	Brown to pale (10YR 5/3-6/3)	Brown to light yellowish brown (10YR 5/3-6/4)	Loamy sand	Soft (dry)	7.2	Wind-modified alluvium. Same depositional unit as 100 but considerably less vegetal disturbance. Boundary: abrupt, smooth.
II	125	Pale brown (10YR 6/3)	Light yellowish brown (10YR 6/4)	Loamy sand	Soft (dry)	7.0	Ephemeral stream deposit of angular gravel and pebbles. Predominantly granitics. Boundary: abrupt, wavy.
	150	Pale brown (10YR 6/3)	Pale brown to light yellowish brown (10YR 6/3-6/4)	Loamy sand to sandy loam	Firm (moist)	7.1-7.2	Wind-modified alluvial fan material. No cultural evidence. Boundary: Clear, smooth.
	175	Pale brown to light yellowish brown (10YR 6/3.5)		Loamy sand to sandy loam	Loose to firm (moist)	7.3-7.4	Wind-modified alluvial fan material. Same depositional unit as level 150 with absence of cultural disturbance and an increase of coarser fan debris.
	225	Pale brown (10YR 6/3)		Loamy sand	Soft (dry)	7.4	Alluvial fan material, less aeolian and an increase in angular-subangular gravel. Boundary: Clear to gradual, wavy.
	320	Light brownish gray to pale brown (10YR 6/2-6/3)	Pale brown to light yellowish brown (10YR 6/3-6/4)	Loamy sand	Loose to firm (moist)	6.8-7.5	Banded sand and gravel. Slope wash deposit. Boundary: abrupt, wavy.
	321	Light brownish gray to pale brown (10YR 6/2-6/3)	Pale brown (10YR 6/3)	Loamy sand to sandy loam	Firm (moist)	7.5-7.8	Probably associated with slope wash deposit level 320. Boundary: Clear, smooth.
I	300	Pale brown (10YR 6/3)	Pale brown (10YR 6/3)	Loamy sand	Firm (moist)	6.7	Silty band mixed with sand. Deposited by retreating water. Boundary: Abrupt, broken.
	310	Pale brown (10YR 6/3)	Light yellowish brown (10YR 6/4)	Sand	Loose to firm (moist)	7.5-7.8	Very similar to level 325 which overlies cobbles, but appears to contain more alluvial fan material near surface of level.
	325	Light gray to very pale brown (10YR 6.5/3-7/2.5)		Sand to loamy sand	Soft-loose (dry)	6.85-7.3	Some slope wash material but predominantly river deposited sand associated with underlying cobble level. This level is very similar to and difficult to distinguish from level 310.
	350	Light brownish gray to pale brown (10YR 6/2-6/3)	Light yellowish brown (10YR 6/4)	Loamy sand	Firm (moist)	6.8-7.1	Silty matrix. Could be overbank deposit associated with underlying cobble level.

[1] Depositional unit

very similar to those found in the present river-deposited beach samples just north of the site. Together, these graded beds of variable, fining upwards texture represent lateral accretion by the Columbia River as it built an alluvial bar.

DU II -- Alluvial Fan

At each site, next oldest depositional unit is alluvial fan material. The two fans have separate sources, small draws to the south. Identification of the deposits as alluvial fans is based on the shape of the deposit; which is thickest away from the river; the decrease in particle size away from the draw; and the micrescopic identification of the grains as sub-angular to sub-rounded. The source of the larger sub-angular particles is undoubtedly the granitic rocks in the slope south of the site; grains of quartz and orthoclase feldspar, the dominant constituents of these rocks, are more common than in the underlying Columbia River deposits.

However, there are significant differences in the deposits at the two sites which indicate that they comprise two distinct fans with different depositional regimes. The fan at 45-DO-242 is thicker and accumulated more rapidly. Gravel, pebbles, and cobbles occur in the lowest fan strata at 45-DO-243, indicating greater stream competence. Some of the strata are massive and contain sufficient silt-sized material to have a blocky structure. These may be mud slides rather than strictly alluvial deposits. In fact, much of the sediment in both fans is probably colluvial rather than directly water transported. Water run-off was apparently confined to the bordering large streams.

The volume of run-off at 45-DO-243 was apparently less. There, small multiple branching channels formed a distributary network. The network moved sand, gravel and, in some cases, pebble-sized sediments but lacked the energy to transport this material as far as the river. Individual beds are thinner and less continuous than at 45-DO-243. The remains of small channels are apparent in profiles.

DU III -- Slope Wash and Aeolian Sediments

The upper unit contains a mixture of surface organic litter material, aeolian deposits and some slope wash sediments. Unlike DU II, the principal transport mechanism is aeolian rather than alluvial. Angular to sub-angular quartz grains compose a loamy sand. No overbank or slack water sediments were encountered at 45-DO-242; the silt band in a small depression (Unit 4N-26W) was interpreted as slope wash material rather than an overbank deposit.

PHYSICAL AND CHEMICAL ANALYSES OF COLUMN SAMPLES

The seven units selected for column sampling, four from 45-DO-242 and three from 45-DO-243, were all from areas with some cultural material. The physical constraints of both sites, i.e., the eastern and western draws, the southern slope, and the Columbia River to grid north, prohibited the sampling of a completely non-cultural off-site column. However, excavation unit 2S-12E at 45-DO-243 (Column #1) contained a minimal amount of habitation debris and was selected for the "off-site" control unit. A capsule interpretation of the column sample analytical results follows, based on data shown in Tables A-3 through A-7, Appendix A.

By determining the smoothness or roughness of sediment grains, and the degree of their rounding, one can deduce the environment of their deposition and the mode of their transport. The postulated aeolian grains were angular to sub-angular, pitted, and sandy-loam to loamy sand in size classification. The predominantly alluvial fan sediments exhibited non-pitted, sub-angular to sub-rounded, grains with an increase in the sand-sized fraction. The basal river-deposited sediments were clean, glossy, rounded to sub-rounded, sand-sized grains. These differences in grain properties were observed in all columns and were used to define depositional boundaries. Microscopic and chemical analyses indicated some cultural peaks that were not in evidence on profile walls.

Using Column #1 samples as the non-disturbed control standard, site 45-DO-243 column samples were analyzed. Overall, they indicated low intensity occupation. The pattern of pH variation with depth--shift from slightly acidic in the upper strata to slightly alkaline at the lower depths--is the typical pH profile in the project region. Cultural debris tends to increase the alkalinity of the soil yet further as evidenced in the results from Columns 2 and 3. The slim increase in pH results from Samples 17 and 23 of Column I is a common occurrence in the lower depths at both sites and is attributed to the slightly alkaline reaction of buried alluvium-colluvium deposits with increasing amounts of $CaCO_3$. Because of its position this area received more slope and sheet wash from the southern slope and organic materials extended deeper in this unit.

Column #2 at 45-DO-243 was selected for sampling because the profile walls revealed heavy cultural disturbance of the natural deposition. Charcoal, carbon staining, bone, shell and organic material were at the highest levels of any unit sampled at the site. Particle size determinations, percentages of minerals, and grain rounding offer evidence of a culturally disturbed, wind-modified alluvial deposit overlying river-rounded alluvium. The angular to sub-angular grains of Samples 5 and 6 indicate ephemeral stream and slope wash deposits while the rounded to sub-rounded grains are common in river deposited alluvium (Samples 15 and 20). The lower peak in calcium ppm (Samples 16 to 19) parallels the results from the control Column #1 and the two upper peaks (Samples 3 to 6 and 8 to 12) closely match the microscopic analysis results which indicate cultural activity at those levels.

Column #3 is from a unit representative of the deposits in the mid-western sector of the site; the profile exemplified a combination of the depositional characteristics of both Column 1 and Column 2. Grain morphological features, particularly the grain rounding determinations, indicate a thorough mixing of aeolian, slope wash and alluvial material. Because of the extensive grain mixing, it is difficult to separate the underlying river-deposited alluvium from the wind-modified alluvial fan material. This difficulty is compounded by the fact excavation never reached the rounded cobble level. The lack of cultural evidence on the profile walls is generally confirmed in the analytical results. Most of the samples lack organic remains. Phosphorous and pH tests show none of the peaks usually associated with cultural activity. In Samples 13 through 17, however, the high calcium percentages were not explained by any cultural evidence on the walls. Microscopic analysis did uncover traces of shell: it is possible that slope wash or alluvial fan debris carried calcium deposits from southern and south-eastern cultural layers to this unit.

The column samples from 45-DO-242 also reveal cultural evidence not observed on profile walls. This is particularly noticeable in Column #2 (Unit 4N-18W). Under the microscope, charcoal was observed that was not recorded on profile drawings. Chemical analysis also bears out the presence of cultural activity in levels that were thought to be sterile. Similarly, Column #4 samples revealed more cultural material in the upper half of the unit than could be discerned in the field.

Unit 4N-26W, where Column 3 was taken, had some of the heaviest concentrations of cultural material observed on any profile walls at the site. Differences in the physical and chemical analytical results of these samples and those of the "off-site" column samples indicate the extent to which human activity can alter the chemistry and composition of samples.

CULTURAL ANALYTIC ZONES, 45-DO-242

Four separate cultural episodes corresponding to natural stratigraphic divisions were defined as cultural analytic zones at 45-DO-242. Table 2-3 summarizes the stratigraphic correspondence, associated radiocarbon dates, and contents of each zone.

It should be kept in mind that the analytic zone may encompass a large cut of complex site stratigraphy. Rather than representing a single circumscribed occupation, it usually comprises numerous activities occurring over a long span of time. Analytic zones may be viewed as cultural occupations or as cultural components. For instance, if a living surface is identified within a zone, it may be referred to as an occupation--a definable set of activities that may be isolated within a limited span of time. If cultural affiliation can be documented, a defined occupation or series of occupations within a zone or zones may be called a cultural component.

All of the zones at 45-DO-242, except Zone 14, appear to be primary cultural deposits, revealing artifact distributions in direct association with activity areas and other cultural features. All three of the upper zones also have radiocarbon dates, which allow us to construct a basic cultural sequence for the site.

ZONE 14

Cultural materials from DU II, Stratum 600, comprise Zone 14. This is the smallest of the cultural assemblages and contains no associated cultural features. Exposed in most excavation units, this zone showed uniformly sparse distributions of cultural materials. In most unit levels, deposits consisted

Table 2-3. Analytic zones of 45-DO-242: stratigraphic definition, radiocarbon dates, and contents.

Zone	Depositional Unit	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic #	Nonlithic #	Bone # wt (g)	Shell # wt (g)	FMR # wt (g)	Hist-Misc #	Total	# Features	Volume (m^3)	Density Objects (m^3)
11	III	100	Surface organic mat and poorly sorted aeolian material	237±80 340±70	909	20	3,510 441	1,726 10,156	650 188,126	2	6,884	5	30.5	225.7
12	II	200	Poorly sorted slope wash and alluvial fan sediments	556±89 701±85 738±67 914±86	1,847	42	5,720 1,749	1,008 5,584	489 257,108	10	9,025	7	33.0	273.5
13	II	300 400 500	Moderately well-sorted slope wash and alluvial fan material	3066±332 3912±459	4,310	141	48,640 18,541	3,188 6,539	1,122 274,481	13	57,548	16	68.7	825.6
14	II	600	Predominantly slope wash, alluvium and colluvium.		74	4	359 186	6 –	12 5,960	2	665	–	20.3	32.8

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[1] See Appendix A, Table A-1.

of little more than a few flakes and small fragments of rodent bone. Zone 14 predates the 3912+459 B.P. radio carbon date taken from the floor of Housepit 2 in Zone 13.

ZONE 13

Zone 13 incorporates a large part of DU II, including Stratum 500, 400, and 300. It contained by far the largest and most varied artifact assemblage of the four zones defined at 45-DO-242. Counts in all artifact categories were consistently high. The number of whole and fragmented bones, in particular, is higher than in other zones. This zone also contained fifteen cultural features, more than double the number observed in any of the other zones. Excavated in all units, Zone 13 showed the greatest intensity of cultural activity, partly as a consequence of the presence of several deeply dug pit structures. The floor of Housepit 2 yielded two radio carbon dates, 3012 +459 B.P. and 3066+232 B.P., which places the earliest well-defined occupation for Zone 3 between 4000-3000 B.P. Diagnostic artifacts recovered from the upper part of Zone 13 indicate a terminal date of no loter than ca. 2500-2000 B.P.

ZONE 12

Zone 12 corresponds to Stratum 200, DU II and produced the next most numerous and varied artifact assemblage. Though high, counts in all artifact categories did not approach the levels reached in Zone 13. Not recorded in all excavation units, this zone nevertheless held eight cultural features. A radiocarbon date of 914+86 B.P. marks the earliest occupation defined in Zone 12, a thick cultural stratum at the top of DU II, Stratum 300. Occupation of Zone 12 continues on from that date until 556±89 B.P. (TX-4178), a radiocarbon date taken from a firepit in a cultural stratum marking the transition to Zone 11. There is therefore a hiatus in the archaeological record from approximately 2000 B.P., the latest date in Zone 13, to approximately 1000 B.P.

ZONE 11

This zone was quite shallow, encompassing DU III, Stratum 100, which is defined as the surface mat and poorly sorted aeolian material. Artifact counts were lower than those observed in either Zone 12 or Zone 13, but significantly higher than those recorded for Zone 14. Five cultural features were identified. Zone 11 has several late occupations, two of which are documented at 340+70 B.P. (TX-4177) and 237+80 B.P. (TX-4172).

SITE 45-DO-243

Four distinct peaks in artifact frequencies were defined as sitewide analytic zones at 45-DO-243. Stratigraphic definition, radiocarbon dates, and contents of each zone are summarized in Table 2-4.

Table 2-4. Analytic zones of 45-DO-243: stratigraphic definition, radiocarbon dates, and contents.

Zone	Depositional Unit	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic #	Nonlithic #	Bone # wt (g)	Shell # wt (g)	FMR # wt (g)	Hist-Misc. #	Total	# Features	Volume (m³)	Density Objects (m³)
21	III	100 110	Surface litter mat and wind-modified alluvium.		528	-	1,039 348	10 13	14 1,600	1	1,647	-	25.5	64.6
		350	Silty overbank deposit											
		325	River deposited sand											
22	III	125 150 175	Ephemeral stream deposit and wind-modified alluvial fan material.	1512±64	872	3	2,362 1,081	255 902	13 2,900	3	3,665	3	23.3	157.3
23	II	225 250 310	Alluvial fan material with increased gravel content and silty bands.		597	3	2,239 873	841 3,355	1 5,000	-	3,873	3	17.9	216.4
24	I	320 321 325 350	Slope wash deposit of banded sand and gravel		258	2	834 491	118 369	1 220	1	1,230	1	18.2	67.6

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[1] See Appendix A, Table A-2.

There are at least three analytic zones with primary cultural deposits. These cultural occupations, however, did not produce nearly the range of feature types and distributions recorded at 45-DO-242, nor did they yield nearly as many lithic, shell or bone artifacts. No occupation appears to have been of long duration, and none appears to represent a large number of people. Stratigraphic separation is evident only in the accumulation of artifacts in different geologic strata. A single date of about 1500 B.P. for Zone 2 suggests that at least one site occupation occurred at about the same time that cultural activity was present in the lower stratum of Zone 2 at 45-DO-242.

ZONE 24

Zone 24 consists of a very small assemblage of cultural materials in sandy strata overlying the basal cobble layer at the site (Stratum 321, Stratum 320, DU I). Lithics, shell, bone, and fire-modified rocks occur in lower counts than in any other analytic zone. The only cultural feature was a small shell concentration.

ZONE 23

This zone encompasses Strata 310, 250 and 225 of DU II. It contains the highest artifact frequencies of any zone at the site. Lithic artifacts are less numerous in this zone than in the upper Zone 22 assemblage but shell fragments occur in markedly higher numbers. The three identified cultural features indicate that this zone contains primary cultural deposits.

ZONE 22

Zone 22 corresponds to Strata 175, 150 and 125 of DU III. It yielded the second largest artifact assemblage, and contained the highest number of lithic tools. Two cultural features were identified, and a radiocarbon date of 1512±64 B.P was obtained from the uppermost sandy stratum, just below the boundary with Zone 1.

ZONE 21

Zone 21 consists of a small but distinct deposit of cultural materials recovered from Strata 110 and 100 at the top of DU III. Although comparable in excavated volume to Zones 22 and 23, this zone yielded a smaller artifact assemblage than either. It does, however, contain fire-modified rocks in quantities comparable to Zone 22: this may indicate a primary cultural deposit or occupation.

3. ARTIFACT ANALYSES

Artifacts recovered from sites 45-DO-242 and 45-DO-243 have been subjected to three separate analyses. Technological analysis describes elements of prehistoric tool manufacture, detailing processes of lithic reduction. Functional analysis describes attributes of wear on tools and develops inferences concerning the use of tools at the site. Stylistic analysis describes morphological elements that have demonstrated temporal and spatial significance and compares recovered artifacts with types defined outside of the project area.

Stone artifacts are treated in the most detail, with other materials entering the classification only when they exhibit specified attributes. Analyses were intentionally biased towards lithics with the assumption that these artifact classes would be of the most value in comparisons with other researchers' work and in developing reconstructions of site activities. Artifacts of bone, shell and other non-lithic materials, though included in the classifications wherever appropriate, are only described in detail selectively.

All artifact analyses take the form of paradigmatic classifications as defined by Dunnell (1971, 1979). In this system, commonly used descriptive terms take on specific meanings. Attributes are selected which can describe morphological variation in the collection. These attributes may correspond to defined stages of tool manufacture, be characteristic of specific tool uses, or indicative of limited periods of time depending on the purpose of the classification. Attributes are combined into sets: those that describe morphological variation in the artifact assemblage without reference to cultural origin are called features, while those that represent cultural activity are called modes. During analysis each artifact is identified by the single feature or mode that characterizes it. By organizing the features and modes into larger organizations termed dimensions, and by cross-tabulating these, sets of comparable and mutually exclusive classes can be formed. From study of these classes, inferences may be drawn concerning the nature of tool manufacture, use, and distribution in time and space.

Our classificatory dimensions and constituent attributes are not always truly exhaustive and must be viewed as gross analytic categories designed to signal obvious morphological variation. Whenever possible, our defined attributes approximate characteristics identified in prior research as important technological, functional, or stylistic indicators. Further, it will be apparent that analytic levels within the paradigmatic classifications often preclude direct comparison with more traditional typological approaches. For example, in several instances these analyses will focus on the tool, and not on the artifacts, because an artifact may have more than one tool or use. These classes are then only related to more standard classifications by cross-correlation with more traditional artifact designations (e.g., biface, drill, or chopper). The following discussion, therefore, involves analysis both at the level of the tool and of the artifact.

In the following subsections we present the descriptive data from technological, functional, and stylistic analysis. The bulk of the data are summarized in tabular form, with text largely reserved for discussion and interpretation of major points. Brief explanations of dimensions and attributes used in each analysis are presented at the beginning of each subsection.

Discussion will treat the two site assemblages separately since the two stratigraphic sequences are distinct, and we cannot, with any certainty, correlate the separate zones. For ease in comparison, all data tables will include both site assemblages. Analysis will be confined to the level of the analytic zone because of difficulties in the identification and excavation of cultural features in the field and the subsequent lack of horizontal exposure. Whenever applicable, as in the stylistic analysis of projectile points, or in the analysis of cultural features, we will identify the feature provenience of individual artifacts but such detailed provenience data will play no part in the technological and functional analyses to follow.

TECHNOLOGICAL ANALYSIS

Prior researchers have described general manufacturing sequences in the production of stone tools, and have thereby identified specific morphological elements associated with certain methods of production and particular steps in the reductive sequence (e.g., Crabtree 1972, 1967a,b; Flenniken and Garrison 1975; Muto 1971, 1976; Smith and Goodyear 1976; Speth 1972; Stafford 1977; Swanson 1975).

While the process of lithic reduction may vary greatly even within defined industries, an idealized trajectory of reduction, with certain fundamental steps, can be constructed. First, the knapper selects a nodule which will serve as a core for the production of flakes of suitable size and shape. The first flakes removed exhibit the weathered surface of the stone. Later flakes show little or no weathered surface, and may have flake scars from the initial flaking. All of these flakes may be removed with a hard hammer of stone, and this creates distinctive large flakes with pronounced bulbs of percussion, strong stress lines and crushed striking platforms. Once flakes are of a suitable size, the knapper modifies them further with a soft hammer of antler or wood, producing smaller flakes with less pronounced bulbs of percussion, finer stress lines, and little or no crushing of the striking platforms. Later, after the artifact has been roughed out to the desired shape, the knapper may remove still smaller flakes with an antler tine to sharpen, finely shape, and maintain working edges on the tool.

This is, of course, an extreme simplification. Not only are there innumerable variations in the sequence of steps and tools used, there are also several related processes with distinctive steps and products. The above description characterizes a flake tool technology, wherein hammers of different materials are used to detach thin, lammellar flakes by direct percussion. There is a related blade industry, in which hammers or punches are used to create long, narrow flakes with prismatic cross sections. This technique requires a more prepared core, and may involve indirect as well as direct percussion (cf., Leonhardy and Muto 1972; Muto 1976). In turn, these industries may be contrasted with the microblade industry in which small, carefully prepared wedge-shaped cores are created and fine fabricators are used for detachment of flakes. Very small, thin blades with one or more arrises are produced, which are in themselves finished tool forms requiring no further modification (cf., Sanger 1968, 1970). While clearly distinct, these three industries need not have been independent, as one could easily complement the others as part of a more comprehensive industry. That this is in fact the case is suggested by the presence of flake and blade industries in early assemblages on the Columbia Plateau (Leonhardy and Rice 1970; Leonhardy et al. 1971).

Artifact types are the best practical indicators of lithic industries (e.g., cores, blades and flakes, and tools made from blades or flakes). Core configuration is distinctive; flakes, blades and microblades are also readily distinguished. Tools often evidence attributes of origin like arris remnants or striking platforms. Other characteristics, though quite recognizable, are less certain diagnostic indicators, and often blend into the general signposts of lithic reduction outlined above (e.g., detritus, flake size, presence or absence of cortex, etc.).

In technological analysis, we record attributes indicative of these steps in stone tool manufacture, and characteristic of these three reduction techniques. In technological analysis we used seven dimensions: OBJECT TYPE, MATERIAL, CONDITION, DORSAL TOPOGRAPHY, TREATMENT, KIND OF MANUFACTURE, and MANUFACTURE DISPOSITION. These describe the kind and condition of artifacts and the materials from which they are made. Descriptive attributes of WEIGHT, LENGTH, WIDTH and THICKNESS were also measured to supplement the classificatory dimensions. Table 3-1 lists these dimensions and attributes.

Before describing the technological assemblage from 45-DO-242 and 45-DO-243, we must advance several cautionary notes. First, analysis at both sites was done by at least seven different analysts over periods of many months. In that time, material type categories were added, and previously defined types were not corrected after these changes. The most important effect of this procedure is that in only the last few units at both sites was opal recorded as a separate category. For all units done previously, opal was included under the category jasper. Further, seven of the 21 units at 45-DO-242 received an abbreviated form of analysis termed LITHAN-AB, which entailed measurement of only those objects designated as functional types and pulled for functional analysis. All other objects were recorded only for material type and attributes of dorsal topography. Figure 3-1 shows the distribution of excavation units at 45-DO-242 analyzed under the two frameworks.

Table 3-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Opal
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Silicized mudstone
- Argillite
- Granite
- Siltstone/mudstone
- Schist
- Graphite/molybdenite
- Bone/antler
- Ochre
- Shell
- Dentalium

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated (heat treatment)

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from the site are listed here; a complete list is available in the Project's Research Design (Campbell 1984d).

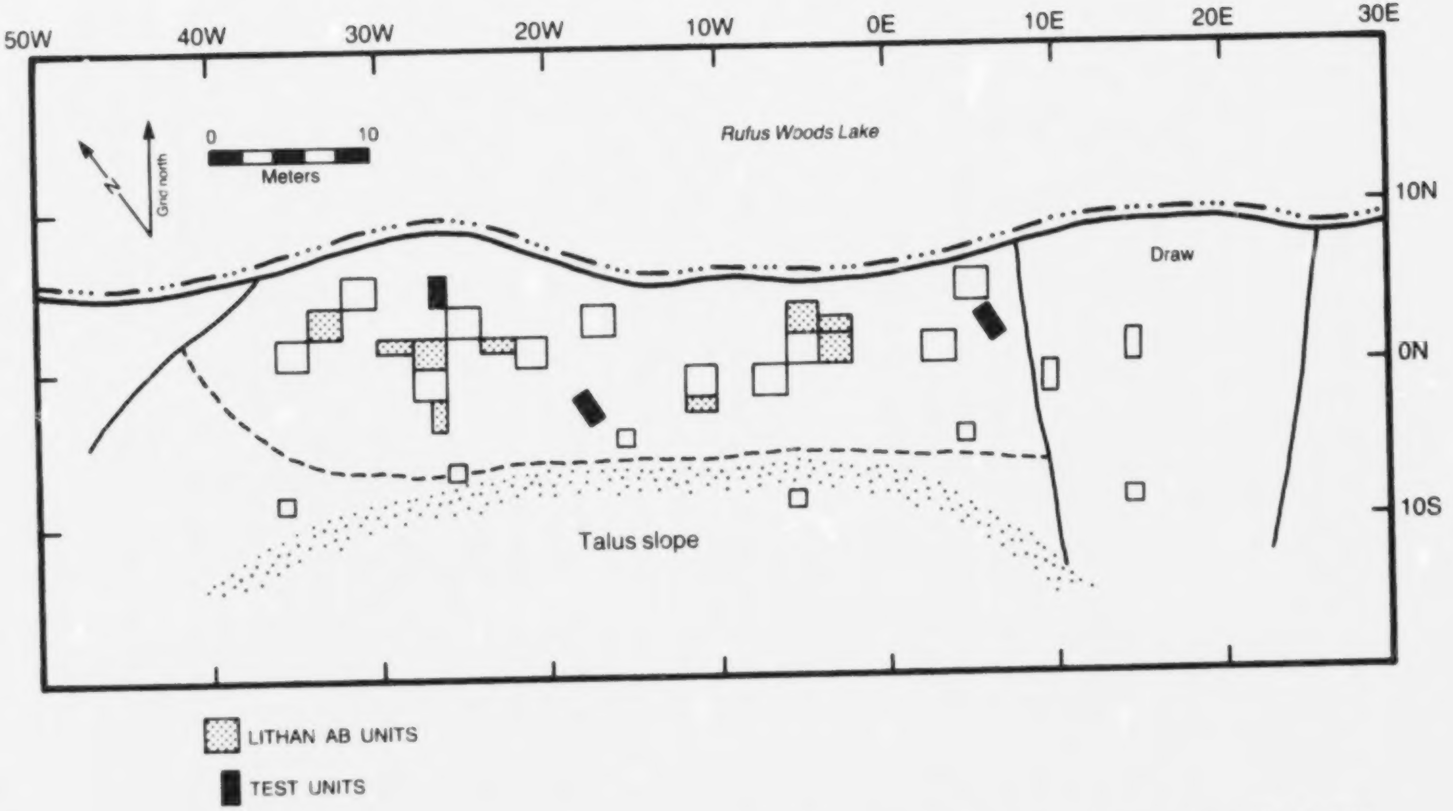
50W
40W
30W
20W
10W
0E
10E
20E
30E
10N
0N
10S
Grid north
N
0
10
Meters
Rufus Woods Lake
Draw
Talus slope
LITHAN AB UNITS
TEST UNITS

Figure 3-1. Distribution of excavation units analyzed under different procedures, 45-DO-242.

MATERIAL TYPES

Table 3-2 presents counts of material types by analytic zones. As shown, the bulk of material from both sites was jasper and chalcedony. Other cryptocrystalline stones occurred in lesser amounts, with frequency falling off in direct relation to crystalline structure, i.e., fine-grained, conchoidally-fracturing stones are more numerous than coarse-grained, non-conchoidally-fracturing stones. In all zones, jasper and chalcedony constitute 56-80% of the material recorded. With the exceptions of quartzite, opal and argillite, no other material constitutes more than 4% of any zonal assemblage, and most fall below 1%. Distributions across zones are very uniform. The most obvious trend shown in the table is a marked preference for jasper at 45-DO-243, with chalcedony, quartzite and argillite fairly evenly distributed across zones.

Non-lithic materials were rare at both sites, and consisted entirely of low frequencies of ocher and bone/antler. Ocher was present only at 45-DO-242, and never exceeds more than 2% of any zonal total. Bone, although present at both sites, was usually below 1% and only once reached 2% (Zone 13, 45-DO-242).

OBJECT TYPES

Most stone objects at both sites were of cryptocrystalline mineral (Table 3-3). Jasper and chalcedony were the favored materials for all object types except tabular flakes and unmodified forms. Conchoidal flakes, linear flakes, chunks, cores and formed objects reflect the preponderance of jasper and chalcedony in the artifact assemblages. For certain object types, one or the other of the two materials was apparently preferred: most linear flakes were made of chalcedony (10 of 12 specimens); most cores were of jasper (6 of 7 specimens). The lack of jasper and chalcedony for tabular flakes would seem to be a matter of tool selection rather than material preference, since tabular flakes are produced most readily from a local quartzite that fractures in tabular planes. The unmodified category shows no cryptocrystalline stones since hammerstones or grinding stones are best made from coarse-grained stones that pit or abrade but do not fracture readily.

Conchoidal flakes are the most common objects in the collection, comprising 5647 specimens or 80% of the total at 45-DO-242, and 1824 specimens or 81% of the total at 45-DO-243. Tabular flakes, chunks and formed objects constitute the majority of other forms. Tabular flakes total 580 specimens or 8% of the artifacts at 45-DO-242, and 157 specimens or 7% of the artifacts at 45-DO-243. Chunks total 420 specimens or 6% of the artifacts at 45-DO-242, 105 specimens or 5% of the artifacts at 45-DO-243. Formed objects total only 218 specimens or 4% of the artifacts at 45-DO-242, and only 51 specimens or 2% of the artifacts at 45-DO-243.

Most object types at both sites occur in the upper three analytic zones. Within this general pattern, only Zone 13 at 45-DO-242 shows any pronounced variation, with 4395 specimens or 63% of the total number recovered from that site. This number reflects the intensive occupation evidenced in this zone,

Table 3-2. Material by zone, 45-DO-242 and 45-DO-243.

Material	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Jasper	616	767	1,918	46	3,347	303	666	405	134	1,508
Col %	61	42	42	52	45	52	66	59	48	59
Chalcedony	193	602	1,773	13	2,581	71	100	48	21	240
Col %	19	33	39	15	34	12	10	07	08	09
Quartzite	92	223	381	19	715	42	69	49	29	189
Col %	09	12	08	22	10	07	07	07	10	07
Opal	35	115	208	-	358	75	46	28	13	162
Col %	04	06	05	00	05	13	05	04	05	06
Argillite	1	12	10	-	23	54	73	83	23	233
Col %	00	01	00	00	00	09	07	12	08	09
Ochre	13	36	104	2	155	-	-	-	-	-
Col %	01	02	02	02	02	00	00	00	00	00
Fine-grained quartzite	9	17	65	1	92	8	8	30	9	55
Col %	01	01	01	01	01	01	01	04	03	02
Fine-grained basalt	2	4	8	1	15	11	12	20	31	74
Col %	00	00	00	01	00	02	01	03	11	03
Bone/Antler	7	6	37	2	52	-	3	3	2	8
Col %	01	00	01	02	01	00	00	00	00	00
Basalt	9	5	20	-	34	4	7	4	5	20
Col %	01	00	00	00	01	01	01	01	02	01
Silicized mudstone	8	13	23	2	46	-	-	1	1	2
Col %	01	01	01	02	01	00	00	00	00	00
Obsidian	-	2	3	-	5	12	8	15	5	40
Col %	00	00	00	00	00	02	01	02	02	02
Petrified wood	1	9	8	-	18	3	9	4	-	16
Col %	00	01	00	00	00	01	01	01	00	01
Silt/Mudstone	4	1	9	-	14	-	9	2	2	13
Col %	00	00	00	00	00	00	01	00	01	01
Granite	2	5	8	-	15	-	1	-	-	1
Col %	00	00	00	00	00	00	00	00	00	00
Schist	3	-	2	-	5	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Shale	-	-	1	-	1	-	1	-	3	4
Col %	00	00	00	00	00	00	00	00	00	00
Sandstone	1	1	2	-	4	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Steatite	-	-	3	-	3	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Indeterminate/misc	2	10	13	2	27	1	3	-	1	5
Col %	00	01	00	02	00	00	00	00	00	00
TOTAL	998	1,828	4,596	88	7,510	584	1,015	692	279	2,570

Table 3-3. Object type by material by zone, 45-DO-242 and 45-DO-243. Weathered and indeterminate objects not included.

Object type	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Conchoidal flake										
Jasper	487	587	1,831	32	2,747	298	485	305	111	1,148
Chalcedony	154	537	1,629	10	2,330	67	85	43	19	214
Petrified wood	1	9	8	-	18	3	7	1	-	11
Obsidian	-	1	2	-	3	10	7	12	4	33
Opal	31	100	193	-	324	61	44	24	13	142
Quartzite	4	18	54	2	78	9	10	3	8	30
Fine-grained quartzite	6	9	52	-	67	7	8	27	6	48
Basalt	4	2	10	-	16	4	8	3	3	18
Fine-grained basalt	2	1	5	1	9	11	10	20	26	67
Silicized mudstone	4	9	16	2	31	-	-	1	1	2
Argillite	1	9	7	-	17	50	63	76	20	209
Granite	-	-	-	-	-	-	1	-	-	1
Indeterminate/misc	-	3	4	-	7	-	1	-	1	2
Linear flake										
Jasper	1	-	1	-	2	2	3	-	4	9
Chalcedony	2	2	6	-	10	-	1	-	-	1
Tabular flake										
Chalcedony	-	-	-	-	-	-	1	-	-	1
Petrified wood	-	-	-	-	-	-	-	1	-	1
Quartzite	72	182	282	14	550	31	55	43	21	150
Fine-grained quartzite	2	3	7	-	12	-	-	2	2	4
Sandstone	-	1	1	-	2	-	-	-	-	-
Schist	2	-	1	-	3	-	-	-	-	-
Indeterminate/misc.	-	2	1	-	3	-	1	-	-	1
Chunk										
Jasper	20	46	112	7	185	11	37	18	4	70
Chalcedony	14	23	69	2	108	-	3	2	1	6
Petrified wood	-	-	-	-	-	-	2	2	-	4
Obsidian	-	-	1	-	1	-	1	-	-	1
Opal	4	11	11	-	26	6	1	1	-	8
Quartzite	15	11	25	1	52	1	-	-	-	1
Fine-grained quartzite	1	3	5	1	10	1	-	-	-	1
Basalt	2	1	2	-	5	-	-	-	-	-
Fine-grained basalt	-	-	1	-	1	-	-	-	-	-
Silicized mudstone	4	2	6	-	12	-	-	-	-	-
Argillite	-	1	-	-	1	-	1	1	-	2
Silt/Mudstone	2	1	9	-	12	-	9	-	-	9
Steatite	-	-	1	-	1	-	-	-	-	-
Schist	1	-	1	-	2	-	-	-	-	-
Shale	-	-	-	-	-	-	-	-	3	3
Indeterminate/misc	-	2	1	1	4	-	-	-	-	-
Core										
Jasper	-	3	3	-	6	1	-	-	-	1
Chalcedony	-	1	-	-	1	-	-	-	-	-
Opal	-	-	2	-	2	-	-	-	-	-
Basalt	-	-	1	-	1	-	-	-	1	1
Formed object										
Jasper	38	33	67	1	140	10	14	5	4	33
Chalcedony	14	16	38	-	68	1	-	1	-	2
Obsidian	-	1	-	-	1	1	-	-	-	1
Opal	-	3	2	-	5	-	-	2	-	2
Quartzite	-	3	3	-	6	-	3	-	-	3
Fine-grained quartzite	-	-	-	-	-	-	-	1	-	1
Basalt	2	-	3	-	5	-	-	-	1	1
Fine-grained basalt	-	2	2	-	4	-	1	-	2	3
Silicized mudstone	-	2	1	-	3	-	-	-	-	-
Argillite	-	-	2	-	2	-	1	-	2	3
Granite	-	-	1	-	1	-	-	-	-	-
Sandstone	1	-	-	-	1	-	-	-	-	-
Silt/Mudstone	-	-	-	-	-	-	-	-	2	2
Steatite	-	-	2	-	2	-	-	-	-	-
Indeterminate/misc	-	1	7	1	9	-	-	-	-	-
Unmodified										
Quartzite	1	-	2	-	3	-	-	-	-	-
Fine-grained quartzite	-	1	1	-	2	-	-	-	-	-
Basalt	1	2	2	-	5	-	-	1	-	1
Fine-grained basalt	-	1	-	-	1	-	-	-	-	-
Granite	-	2	-	-	2	-	-	-	-	-
Shale	-	-	1	-	1	-	1	-	-	1
Indeterminate/misc	-	2	-	-	2	-	-	-	-	-
TOTAL	904	1,848	4,386	76	7,028	526	872	585	298	2,281

wherein three housepits, three external firepits and six other pits were noted in association with a series of living surfaces (see Chapter 5 that describes cultural features and associated artifact assemblages). Zone 13 produced consistently higher counts in every object category, in some cases tripling the next highest zonal count.

MANUFACTURE

Chipping is the only form of manufacture recorded for object types in either site assemblage (Table 3-4). However, only 5.1% of the objects from 45-DO-242 and 3.8% of the objects from 45-DO-243, show any evidence of manufacture beyond initial removal from a core. The proportion of chipped objects across zonal assemblages ranges from a high of 9.3% in Zone 11 to a low of 1.3% in Zone 14, with most zonal assemblages showing about 3-5% chipped objects.

Table 3-4. Type of manufacture by zone, 45-DO-242 and 45-DO-243.

Type of manufacture	45-DO-242					45-DO-243				
	Zone				Total[1]	Zone				Total[1]
	11	12	13	14		21	22	23	24	
None	819	1,566	4,119	73	6,577	511	825	576	245	2,157
Col %	89.9	94.5	95.3	96.1	94.4	97.0	94.3	96.5	94.6	95.5
Chipping	85	89	182	1	357	16	40	18	12	86
Col %	9.3	5.4	4.2	1.3	5.1	3.0	4.6	3.0	4.6	3.8
Indeterminate	7	2	22	2	33	-	10	3	2	15
Col %	0.8	0.1	0.5	2.6	0.5	0.0	1.1	0.5	0.8	0.7
TOTAL	911	1,657	4,323	76	6,967	527	875	597	258	2,258

[1] <1/4 in flakes and non-lithics deleted.

Heat treatment prior to manufacture is not well represented in any zonal assemblage (Table 3-5). However, all analytic zones show some evidence of burning or dehydration, and we may assume that heat treatment was present, although not commonly practiced.

Both primary and secondary reduction were prevalent at both sites over the span of occupation (Table 3-6). The proportion of objects with cortex remnants is remarkably consistent across all zones, ranging from about 8-11% at 45-DO-242 and from about 4-6% at 45-DO-243. The distribution of objects without cortex parallels that observed for object types, with high peaks in Zone 13, 45-DO-242, and Zone 22, 45-DO-243. Objects with partial and complete cortex repeat this pattern at 45-DO-242, but at 45-DO-243 Zones 21, 22 and 23, have much more even counts. It is also interesting to note that proportions of attributes are virtually identical at the two sites. Objects without cortex number 6,120 specimens or 85% of the total at 45-DO-242 and 2,080 specimens or 92% of the total at 45-DO-243. Objects with partial and complete cortex number 160 specimens or 8% of the total at 45-DO-242 and 166 specimens

Table 3-5. Treatment by zone, 45-DO-242 and 45-DO-243.

Treatment	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
None	892	1,628	4,255	73	6,848	510	842	553	255	2,160
Col %	98	98	98	96	98	98	96	93	98	97
Burned	18	28	59	3	108	12	10	5	1	28
Col %	02	02	01	04	02	02	01	01	00	01
Dehydrated	1	1	9	–	11	5	23	39	3	70
Col %	00	00	00	00	00	00	03	06	01	03
TOTAL	911	1,657	4,323	76	6,967	527	875	597	259	2,258

Table 3-6. Dorsal topography by zone, 45-DO-242 and 45-DO-243.

Dorsal topography	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
None	814	1,439	3,802	65	6,120	491	805	546	238	2,080
Col %	89	87	88	85	88	93	92	92	92	92
Partial cortex	61	115	311	5	492	22	29	30	13	94
Col %	07	07	07	07	07	04	03	05	05	04
Complete cortex	5	20	40	3	68	2	2	5	3	12
Col %	01	01	01	04	01	00	00	01	01	00
Indeterminate	31	83	170	3	287	12	39	16	5	72
Col %	03	05	04	04	04	02	04	02	02	03
TOTAL	911	1,657	4,323	76	6,967	527	875	597	259	2,258

or 5% of the total at 45-DO-243. Attributes of dorsal topography are related to material type in Table 3-7, which lists object types by cryptocrystalline and non-cryptocrystalline material groups and by the presence or absence of cortex. Although both sites evidence primary and secondary reduction, there are some marked differences in the zonal distributions of object types with cortex. For example, at 45-DO-242, 71% of the specimens with cortex are cryptocrystalline stones, while at 45-DO-243, 76% of the specimens with cortex are non-cryptocrystalline stones. Also, about 4% of the total number of conchoidal flakes at 45-DO-242 have cortex, whereas only 2% of conchoidal flakes at 45-DO-243 have cortex. There appears to have been less primary reduction of cryptocrystalline stones at 45-DO-243 than at 45-DO-242, although the kinds of object types and their relative proportions across zones are similar. This inference is borne out by the absence of cores from 45-DO-243. Of course, the prevalence of non-cryptocrystalline objects with cortex attests

Table 3-7. Technological classes[1] by zone, 45-DO-242 and 45-DO-243.

Technological Class	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Conchoidal flakes										
No cortex										
Cryptocrystalline	670	1,187	3,314	41	5,222	371	613	376	143	1,503
Other	18	37	102	4	161	69	94	112	61	336
Partial cortex										
Cryptocrystalline	7	20	126	1	154	3	4	1	1	9
Other	4	10	41	1	56	9	3	13	3	28
Complete cortex										
Cryptocrystalline	–	1	1	–	2	–	–	–	–	–
Other	–	1	8	–	9	–	–	–	–	–
Linear flakes										
No cortex										
Cryptocrystalline	3	4	10	–	17	2	4	–	5	11
Partial cortex										
Cryptocrystalline	–	1	1	–	2	–	–	–	–	–
Tabular flakes										
No cortex										
Cryptocrystalline	–	–	–	–	–	–	1	1	–	2
Other	45	119	180	9	353	21	36	26	14	97
Partial cortex										
Other	27	51	92	3	173	8	17	14	6	45
Complete cortex										
Other	4	15	28	2	49	2	2	5	3	12
Chunks										
No cortex										
Cryptocrystalline	25	24	69	7	125	15	42	22	3	82
Other	7	3	5	1	16	1	1	1	3	6
Partial cortex										
Cryptocrystalline	2	5	9	–	16	1	1	–	–	2
Other	14	14	25	–	53	1	–	–	–	1
Cores										
No cortex										
Cryptocrystalline	–	4	3	1	8	1	–	–	–	1
Partial cortex										
Cryptocrystalline	–	1	2	–	3	–	–	–	–	–
Other	–	–	1	–	1	–	–	–	1	1
Formed objects										
No cortex										
Cryptocrystalline	49	48	104	1	202	11	12	8	4	35
Other	–	1	6	–	7	–	1	–	3	4
Partial cortex										
Cryptocrystalline	4	4	3	–	11	–	–	–	–	–
Other	2	5	8	–	15	–	4	1	2	7
Unmodified										
Partial cortex										
Other	1	4	2	–	7	–	–	1	–	1
Complete cortex										
Other	1	2	3	–	6	–	–	–	–	–

[1] The technological classes used are object type by dorsal topography by material.

to primary reduction of stones at 45-DO-243, but it seems that most cryptocrystalline tool forms recovered from that site were probably brought in as finished forms or were reduced from flakes or blanks.

The distribution of flake size can also be taken as an indicator of secondary reduction on the sites. Table 3-8 shows the distribution of flake size by material throughout the eight analytic zones. The majority of all specimens are >1/4 in in size (96% at 45-DO-242 and 88% at 45-DO-243). Less than 1/4 in flakes are comparatively rare (5% at 45-DO-242; and 12% at 45-DO-243). Less than 1/8 in flakes, a few of which were recovered, are not discussed here as they were not reliably sampled with a 1/8-in screen. Across analytic zones, the distribution of flake size shows some marked variations. Within 45-DO-242, Zone 13, which contains the most intensive cultural activity in the form of a number of housepits, has by far the lowest proportion of <1/4 in flakes. The highest proportions of <1/4 in flakes at 45-DO-243, occur in Zones 22 and 23, which are roughly contemporaneous with the cultural activities represented in Zone 13 at 45-DO-242. This pattern might indicate greater attention to secondary reduction, perhaps in the form of tool refinishing or maintenance at 45-DO-243 during the time that 45-DO-242 was the scene of a housepit settlement. Whether the two sites were in use at the same time is certainly open to conjecture, but the pattern of smaller flakes at 45-DO-243 during the Hudnut Phase is possibly suggestive of the spatial distribution of related activities. Regardless of the relationship of activities at the two sites, it is evident that secondary reduction was common at both locations. That the vast majority of <1/4 in flakes are jasper and chalcedony is consistent with the greater number of object types, particularly formed object types, in those two material types.

Distinctions between primary and secondary reduction are also brought out in Table 3-9, which lists length, thickness and width measurements of conchoidal flakes. The table clearly reveals the distinction between primary and secondary flakes--these latter are much less thick and wide. Length seems to be a less sensitive measure, although it still evidences the trend for decreasing size. Neither the size of secondary or primary flakes varies much from zone to zone or from site to site (variable statistics occur with smaller sample sizes in any given zone). Primary flakes vary the most, and we might predict as much given the differences in the occurrence of raw materials and variation in their internal structure: some stones may be found in smallish, eroded nodules, others may occur as large veins or outcrops. Only when flakes are further reduced into tools or formed objects is consistency in length, width or thickness achieved.

INDUSTRIES

All of the stages of the lithic manufacturing process are represented by the object types recovered from sites 45-DO-242 and 45-DO-243: raw materials, cores, flakes, and finished tools. As stated, flakes, predominantly of cryptocrystalline, conchoidally-fracturing stones, constitute the most plentiful object type. Cores are well represented at 45-DO-242 but rare at

Table 3-8. Flake size by material and zone, 45-DO-242 and 45-DO-243.

Flake size (in) by material	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Jasper										
>1/4	558	670	1,818	41	3,087	263	550	328	123	1,264
<1/4	58	94	98	5	255	40	111	75	11	238
<1/8	–	3	2	–	5	–	5	1	–	6
Chalcedony										
>1/4	185	582	1,746	12	2,525	68	90	46	20	224
<1/4	8	20	27	1	56	3	10	2	1	16
Quartzite										
>1/4	92	215	278	17	702	41	68	46	29	184
<1/4	–	8	3	2	13	1	1	3	–	5
Opal										
>1/4	35	114	208	–	357	67	45	27	13	152
<1/4	–	1	–	–	1	8	1	1	–	10
Argillite										
>1/4	1	10	9	–	20	50	65	77	22	214
<1/4	–	2	1	–	3	4	8	6	1	19
Fine-grained quartzite										
>1/4	9	17	65	1	92	8	8	30	8	54
Fine-grained basalt										
>1/4	2	4	8	1	15	11	11	20	28	70
<1/4	–	–	–	–	–	–	1	–	3	4
Basalt										
>1/4	9	5	19	–	33	4	7	4	5	20
<1/4	–	–	1	–	1	–	–	–	–	–
Obsidian										
>1/4	–	2	3	–	5	11	8	12	4	35
<1/4	–	–	–	–	–	1	–	3	1	5
Petrified wood										
>1/4	1	9	8	–	18	3	9	4	–	16
Silt/Mudstone										
>1/4	4	1	9	–	14	–	9	2	2	13
Granite										
>1/4	1	4	8	–	13	–	1	–	–	1
<1/4	1	1	–	–	2	–	–	–	–	–
Schist										
>1/4	3	–	2	–	5	–	–	–	–	–
Shale										
>1/4	–	–	1	–	1	–	1	–	3	4
Sandstone										
>1/4	1	1	2	–	4	–	–	–	–	–
Steatite										
>1/4	–	–	3	–	3	–	–	–	–	–
Indeterminate/misc										
>1/4	2	10	13	2	27	–	–	–	–	–
TOTAL										
>1/4	911	1,657	4,323	76	6,967	527	872	597	258	2,253
<1/4	67	125	130	8	330	57	132	91	18	298
<1/8	–	4	2	–	6	–	5	1	–	6

Table 3-9. Measurements of concholdally flaked material by zone, 45-DO-242 and 45-DO-243.

Attributes	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Length (mm)										
No cortex										
Cryptocrystalline										
x̄	10.2	10.7	10.7	10.7	10.7	10.8	9.6	9.0	8.8	9.5
s.d.	5.5	4.4	5.0	7.9	5.0	5.1	4.1	3.9	2.6	4.3
n	334	693	2,138	26	3,191	194	246	180	65	685
Other										
x̄	13.6	17.5	16.1	5.0	16.0	13.5	13.1	12.4	12.6	12.8
s.d.	7.7	9.7	10.6	0.0	10.1	7.9	9.2	8.3	8.7	8.4
n	10	24	62	2	98	32	24	48	26	130
Partial cortex										
Cryptocrystalline										
x̄	22.3	16.5	16.3	6.0	16.4	10.3	19.7	0.0	0.0	15.0
s.d	24.8	11.6	16.6	0.0	16.1	4.2	15.3	0.0	0.0	11.3
n	3	11	78	1	93	3	3	-	-	6
Other										
x̄	22.3	28.8	36.8	14.0	34.1	18.5	0.0	27.0	53.5	28.4
s.d.	11.2	15.6	34.0	0.0	30.8	7.3	0.0	20.5	20.5	20.0
n	3	5	30	1	39	4	-	11	2	17
Complete cortex										
Other										
x̄	0.0	0.0	45.2	0.0	45.2	0.0	0.0	0.0	0.0	0.0
s.d.	0.0	0.0	46.1	0.0	46.1	0.0	0.0	0.0	0.0	0.0
n	-	-	5	-	5	-	-	-	-	-
Thickness (.1mm)										
No cortex										
Cryptocrystalline										
x̄	17.4	18.5	20.7	21.8	19.2	15.4	17.1	16.7	15.4	16.4
s.d.	10.7	13.5	15.4	16.7	13.8	9.1	11.6	10.7	10.1	10.7
n	384	369	609	23	1,385	306	464	301	112	1,183
Other										
x̄	18.6	28.6	27.1	27.5	26.3	19.5	20.0	19.1	19.5	19.5
s.d.	10.8	24.5	15.8	24.7	16.7	10.7	15.8	13.4	12.6	13.3
n	10	11	50	2	73	80	70	67	41	258
Partial cortex										
Cryptocrystalline										
x̄	37.4	38.8	30.9	23.0	32.1	17.0	66.7	0.0	0.0	45.4
s.d.	19.7	21.8	19.8	0.0	20.0	7.0	40.1	0.0	0.0	39.1
n	5	15	100	1	121	3	4	-	-	7
Other										
x̄	40.5	67.7	75.7	28.0	70.5	42.1	24.3	75.8	106.00	63.0
s.d.	19.8	41.1	65.1	0.0	58.7	25.3	4.6	69.1	34.6	54.8
n	4	10	37	1	52	8	3	12	3	26
Complete cortex										
Other										
x̄	0.0	134.0	83.1	0.0	89.9	0.0	0.0	0.0	0.0	0.0
s.d.	0.0	0.0	50.3	0.0	50.0	0.0	0.0	0.0	0.0	0.0
n	-	1	7	-	8	-	-	-	-	-
Width (1mm)										
No cortex										
Cryptocrystalline										
x̄	8.5	9.7	11.1	8.2	10.1	8.4	8.7	9.5	8.4	8.8
s.d.	3.9	5.5	6.8	3.3	5.8	3.7	3.9	5.9	3.6	4.4
n	186	208	368	12	774	182	255	152	73	662
Other										
x̄	10.8	11.8	15.7	22.5	15.1	12.8	14.5	12.4	9.6	12.4
s.d.	9.7	8.8	7.8	19.1	8.6	5.1	10.4	7.6	4.1	7.4
n	5	5	35	2	47	39	31	53	25	148
Partial cortex										
Cryptocrystalline										
x̄	17.3	17.5	14.0	0.0	14.6	10.3	17.0	0.0	0.0	13.7
s.d.	12.9	13.0	7.0	0.0	8.2	3.5	4.6	0.0	0.0	5.2
n	3	11	65	-	79	3	3	-	-	6
Other										
x̄	28.0	28.6	34.5	18.0	32.4	14.4	0.0	31.4	29.0	28.0
s.d	13.5	13.9	35.1	0.0	31.3	2.9	0.0	29.7	5.6	18.7
n	3	5	29	1	38	5	-	9	3	17
Complete cortex										
Other										
x̄	0.0	81.0	29.0	0.0	33.6	0.0	0.0	0.0	0.0	0.0
s.d	0.0	0.0	17.5	0.0	20.1	0.0	0.0	0.0	0.0	0.0
n	-	1	6	-	7	-	-	-	-	-

45-DO-243. Finished or formed tools, although not nearly as numerous as flakes and chunks, are common in all zones at both sites.

Tools manufactured at both 45-DO-242 and 45-DO-243 were the products of at least two related, but distinct industries. One made use, primarily, of CCS stones which had to be gathered some distance away, and transported to the site as cores, blanks or preforms. The other, a more expedient industry, utilized locally available non-cryptocrystalline stones. These two industries resulted in quite distinct products: conchoidal flakes, linear flakes, chunks, cores, and formed objects, in the first instance and tabular flakes and cores in the second. The more best represented industry was that concentrating on the reduction of jasper and chalcedony. This generalized flake tool technology produced the largest and most varied tool assemblage at both sites (Table 3-10 and 3-11). The subsidiary flake tool industry focused on the reduction of the locally plentiful quartzite, which, when struck, commonly fractures in tabular planes, producing thick but handy flake tool forms.

Figure 3-2 illustrates salient features of the various material industries documented at sites 45-DO-242 and 45-DO-243. As shown, the generalized flake tool technology comprises the vast majority of debitage, flake tool forms, and formed tool forms recovered from either site. The relative increase in quartzite in the flake tool category reflects the expedient reductive strategy mentioned above. Jasper and chalcedony are consistently the preferred stone, and jasper and chalcedony conchoidal flakes are the most numerous form at both sites. Formed objects were manufactured from a wide variety of CCS and non-CCS stones but were generally made of jasper, chalcedony and quartzite. The great majority of all objects exhibit no cortex, and this coupled with the scarcity of cores, indicates that most primary reduction took place away from the sites. Debitage dimensions are remarkably consistent irrespective of zone or site, and clearly demonstrate size differences between products of primary and secondary manufacture.

TEMPORAL AND SPATIAL DISTRIBUTION

There are very few changes in the stone tool assemblages at either site over the span of occupation. Figures 3-3 and 3-4 illustrate the consistency observed in features of the debitage and tool assemblages recovered from each analytic zone. As shown, general aspects of the cryptocrystalline industries are remarkably similar between sites 45-DO-242 and 45-DO-243, with the most noticeable difference being the slightly higher proportion of <1/4 in flakes in the zonal assemblages from 45-DO-243, and the presence of flake tools and formed tools with cortex in the zonal assemblages from 45-DO-242, a pattern which might reflect more secondary reduction/finishing knapping at the former site and more primary reduction at the latter site. There does appear to be a marked difference in the nature of the reduction of non-cryptocrystalline stones at the two sites. As shown in the chart, there are much higher zonal percentages of non-cryptocrystalline conchoidal flakes and lower percentages of tabular flakes with and without cortex at 45-DO-243 than at 45-DO-242. This would seem to suggest that reduction of the locally available tabular-fracturing quartzite was not emphasized at 45-DO-243 to the degree that it was

Table 3-10. Material by object type, functional type, dorsal topography, and zone, 45-DO-242.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Cryptocrystalline silicate	Conchoidal flake	Projectile point base	None	-	-	1	-	1
		Projectile point tip	None	-	1	-	-	1
		Biface	None	2	2	2	-	6
		Drill	Partial cortex	-	-	1	-	1
		Scraper	None	-	3	6	-	9
			Partial cortex	-	-	1	-	1
		Core	None	-	-	1	-	1
		Resharpening flake	None	1	1	2	-	4
		Bifacially retouched flake	None	3	1	2	-	6
		Unifacially retouched flake	None	11	5	9	-	25
			Partial cortex	-	1	4	-	5
		Utilization only	None	21	20	61	1	103
			Partial cortex	-	4	3	-	7
			Indeterminate	1	1	3	-	5
		None	None	630	1,162	3,228	40	5,060
			Partial cortex	7	15	117	1	140
			Complete cortex	-	1	1	-	2
			Indeterminate	7	16	19	-	42
	Linear flake	Linear flake	None	3	2	7	-	12
	Chunk	Biface	None	2	-	2	-	4
		Graver	None	-	1	-	-	1
		Core	None	-	1	-	1	2
		Bifacially retouched flake	None	-	-	1	-	1
		Unifacially retouched flake	None	2	-	3	-	5
			Partial cortex	-	-	1	-	1
		Utilization only	None	1	-	2	-	3
			Indeterminate	1	-	1	-	2
		Indeterminate	None	1	-	-	-	1
			Indeterminate	-	-	1	-	1
		None	None	17	21	58	6	102
			Partial cortex	2	5	8	-	15
			Indeterminate	12	52	115	2	181
	Core	Biface	None	-	1	2	-	3
			Partial cortex	-	-	1	-	1
		Drill	None	-	1	-	-	1
		Core	None	-	1	-	-	1
			Partial cortex	-	-	1	-	1
		Bifacially retouched flake	None	-	1	-	-	1
		Unifacially retouched flake	None	-	-	1	-	1

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Cryptocrystalline silicate	Formed object	Projectile point	None	6	11	22	-	39
			Indeterminate	-	-	1	-	1
		Projectile point base	None	9	5	12	-	26
			Partial cortex	-	-	1	-	1
		Projectile point tip	None	6	7	13	-	26
			Partial cortex	1	1	1	-	3
		Biface	None	15	14	32	-	61
			Partial cortex	2	1	-	-	3
		Drill	None	1	2	3	-	6
			Partial cortex	1	-	-	-	1
		Graver	None	-	1	2	-	3
		Scraper	None	4	4	10	1	19
			Partial cortex	-	1	-	-	1
		Burin spall	None	-	1	-	-	1
		Bifacially retouched flake	None	4	1	5	-	10
			Partial cortex	-	-	1	-	1
		Unifacially retouched flake	None	4	1	5	-	10
			Partial cortex	-	1	-	-	1
			Indeterminate	-	1	-	-	1
	Weathered	Projectile point tip	Indeterminate	-	-	1	-	1
		None	Indeterminate	1	2	3	1	7
	Indeterminate	Biface	None	1	-	-	-	1
		Ut'' ization only	None	-	2	3	-	5
Quartzite	Conchoidal flake	Tabular Knife	Partial cortex	-	1	2	-	3
		None	None	3	11	25	1	40
			Partial cortex	1	5	22	1	29
			Complete cortex	-	1	5	-	6
	Tabular	Tabular knife	None	3	4	8	-	15
			Partial cortex	2	4	8	-	14
			Complete cortex	1	1	1	-	3
		Bead	None	-	1	-	-	1
		None	None	38	112	169	9	328
			Partial cortex	25	47	80	3	155
			Complete cortex	3	13	26	2	44
	Chunk		None	4	-	2	1	7
			Partial cortex	10	10	18	-	38
			Indeterminate	1	1	5	-	7
	Formed object	Chopper	Partial cortex	-	-	1	-	1
		Tabular knife	Partial cortex	-	3	2	-	5
	Weathered	Utilization only	Indeterminate	-	-	1	-	1
		None	Indeterminate	-	1	1	-	2
	Unmodified	Hammerstone	Partial cortex	-	-	1	-	1
			Complete cortex	1	-	1	-	2

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Fine-grained quartzite	Conchoidal flake	None	None	5	7	43	-	55
			Partial cortex	1	2	7	-	10
			Complete cortex	-	-	2	-	2
	Tabular		None	2	2	3	-	7
			Partial cortex	-	-	3	-	3
			Complete cortex	-	1	1	-	2
	Chunk		None	1	1	1	-	3
			Partial cortex	-	2	3	-	5
			Complete cortex	-	-	-	1	1
			Indeterminate	-	-	1	-	1
	Weathered		Indeterminate	-	1	-	-	1
	Unmodified	Hammerstone	Complete cortex	-	1	1	-	2
Basalt	Conchoidal flake	None	None	4	1	9	1	15
			Partial cortex	2	1	6	-	9
			Indeterminate	-	1	-	-	1
	Chunk	Tabular knife	Partial cortex	1	-	-	-	1
		None	None	-	-	1	-	1
			Partial cortex	1	1	2	-	4
	Core	Core	Partial cortex	-	-	1	-	1
	Formed object	Projectile point	None	-	1	1	-	2
		Biface	Partial cortex	-	-	1	-	1
		Chopper	Partial cortex	1	1	3	-	5
		Tabular knife	Partial cortex	1	-	-	-	1
	Unmodified		Partial cortex	1	-	-	-	1
		Hammerstone	Partial cortex	-	2	-	-	2
		Millingstone	Complete cortex	-	-	1	-	1
		Utilization only	Partial cortex	-	1	-	-	1
		Indeterminate	Partial cortex	-	-	1	-	1
	Indeterminate	Tabular knife	None	-	-	1	-	1
Granitic	Conchoidal flake		Complete cortex	-	-	1	-	1
		None	None	1	1	4	-	6
			Partial cortex	-	-	2	-	2
			Indeterminate	-	1	-	-	1
	Formed object	Millingstone	Partial cortex	-	-	1	-	1
	Unmodified	Hopper mortar	Complete cortex	-	1	-	-	1
		Millingstone	Partial cortex	-	1	-	-	1
Obsidian	Conchoidal flake	None	None	-	1	2	-	3
	Chunk		None	-	-	1	-	1
	Formed object	Projectile point base	None	-	1	-	-	1

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Other lithic	Conchoidal flake	Utilization only	None	1	2	-	-	3
			Partial cortex	-	-	1	-	1
		None	None	4	15	21	2	42
			Partial cortex	-	1	1	-	2
			Indeterminate	-	-	1	-	1
	Tabular	Tabular knife	None	1	-	-	-	1
			Partial cortex	-	-	1	-	1
		None	None	1	-	-	-	1
			Indeterminate	-	1	1	-	2
	Chunk	Indeterminate	Indeterminate	2	1	9	-	12
		None	None	2	2	1	-	5
			Partial cortex	2	1	2	-	5
			Indeterminate	1	-	5	-	6
	Formed object	Biface	None	-	-	1	-	1
		Chopper	Partial cortex	-	1	-	-	1
		Drill	None	-	-	1	-	1
		Shaft abrader	Indeterminate	1	-	-	-	1
		Bead	None	-	-	2	-	2
		Bifacially retouched flake	None	-	-	1	-	1
		Unifacially retouched flake	Indeterminate	-	1	-	-	1
	Unmodified	Indeterminate	Indeterminate	-	-	1	-	1
	Indeterminate		Indetnrminate	2	-	-	-	2
Indeterminate lithic	Conchoidal flake	Tabular knife	Partial cortex	-	-	1	-	1
		None	None	-	2	3	-	5
			Partial cortex	-	1	-	-	1
	Tabular		None	-	1	1	-	2
	Chunk	Indeterminate	None	-	-	-	1	1
		None	Partial cortex	-	1	-	-	1
			Indeterminate	-	1	1	-	2
	Formed object	Projectile point tip	None	-	1	-	-	1
		Bead	None	-	-	6	1	7
		Indeterminate	Partial cortex	-	-	1	-	1
	Unmodified	Tabular knife	Indeterminate	-	1	-	-	1
		Hammerstone	Complete cortex	-	1	-	-	1
	Indeterminate/ misc	None	Indeterminate	2	1	-	-	3
TOTAL				911	1,657	4,323	76	6,967

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[1] < 1/4 in flakes and non-lithics deleted.

Table 3-11. Material by object type, functional type, dorsal topography, and zone, 45-DO-243.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				21	22	23	24	
Crytocrystalline silicate	Conchoidal flake	Projectile point base	None	-	1	-	-	1
		Scraper	None	-	1	-	-	1
		Resharpening flake	None	-	2	-	-	2
		Bifacially retouched flake	None	1	-	-	-	1
		Unifacially retouched flake	None	-	4	1	-	5
		Utilization only	None	9	12	3	-	24
			Indeterminate	-	1	-	-	1
		None	None	350	585	360	139	1,434
			Partial Cortex	3	4	1	1	9
			Indeterminate	6	21	8	3	38
	Linear flake	Linear flake	None	2	4	1	1	10
	Tubular	None	None	-	1	1	-	2
	Chunk	Biface	None	-	-	1	-	1
		Core	None	1	1	-	-	2
			Indeterminate	-	1	-	-	1
		Utilization only	None	-	2	2	-	4
		None	None	14	37	19	3	73
			Partial Cortex	1	1	-	-	2
			Indeterminate	1	1	1	2	5
	Core	Biface	None	1	-	-	-	1
	Formed Object	Projectile point	None	3	1	4	1	9
		Projectile point base	None	-	1	-	-	1
		Projectile point tip	None	2	1	1	1	5
		Biface	None	2	5	3	-	10
			Indeterminate	1	1	-	-	2
		Drill	None	-	1	-	-	1
		Scraper	None	1	2	-	2	5
		Bifacially retouched flake	None	1	1	-	-	2
		Unifacially retouched flake	None	1	-	-	-	1
			Indeterminate	-	1	-	-	1
	Indeterminate/ Misc	Utilization only	None	1	1	-	-	2

Table 3-11. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone 21	Zone 22	Zone 23	Zone 24	Total[1]
Quartzite	Conchoidal flake	Chopper	Partial cortex	–	–	1	–	1
		Tabular knife	None	–	–	–	1	1
		None	None	5	10	–	5	20
			Partial cortex	4	–	2	2	8
	Tabular	Tabular knife	None	1	6	2	–	9
			Partial cortex	–	5	2	–	7
			Complete cortex	1	1	–	1	3
		Indeterminate	None	–	–	1	–	1
		None	None	20	30	22	13	85
			Partial cortex	8	12	12	6	38
			Complete cortex	1	1	4	1	7
	Chunk		Partial cortex	1	–	–	–	1
	Formed object	Tabular knife	Partial cortex	–	3	–	–	3
Fine-grained Quartzite	Conchoidal flake	Bifacially retouched flake	None	–	–	1	–	1
		Utilization only	None	–	1	–	–	1
		None	None	5	7	22	6	40
			Partial cortex	2	–	4	–	6
	Tabular	Utilization only	Complete cortex	–	–	1	–	1
		None	None	–	–	1	1	2
			Complete cortex	–	–	–	1	1
	Chunk		None	1	–	–	–	1
	Formed object	Chopper	Partial cortex	–	–	1	–	1
Basalt	Conchoidal flake	Utilization only	None	–	–	–	2	2
		None	None	14	16	19	27	76
			Partial cortex	1	–	4	–	5
	Core	Chopper	Partial cortex	–	–	–	1	1
	Formed object	Projectile point	None	–	–	–	1	1
		Biface	None	–	–	–	1	1
		Chopper	Partial cortex	–	1	–	1	2
	Unmodified		Partial cortex	–	–	1	–	1
	Indeterminate/ Misc	Utilization only	None	–	1	–	–	1
Granitic	Conchoidal flake	None	None	–	1	–	–	1

Table 3-11. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone 21	Zone 22	Zone 23	Zone 24	Total[1]
Obsidian			None	10	7	12	4	33
	Chunk		None	–	1	–	–	1
	Formed object	Bifacially retouched flake	None	1	–	–	–	1
Other lithic	Conchoidal flake	Utilization only	None	1	–	–	1	2
		None	None	44	59	70	19	192
			Partial cortex	2	3	2	1	8
			Indeterminate	3	1	5	–	9
	Chunk	Indeterminate	Indeterminate	–	9	–	–	9
		None	None	–	1	1	3	5
	Formed object	Biface	None	–	1	–	1	2
		Chopper	Partial cortex	–	–	–	1	1
		Indeterminate	None	–	–	–	2	2
	Unmodified		Indeterminate	–	1	–	–	1
	Indeterminate		Indeterminate	–	–	2	–	2
Indeterminate lithic	Conchoidal flake	None	None	–	–	–	1	1
			Indeterminate	–	1	–	–	1
	Tabular		None	–	1	–	–	1
	Indeterminate/misc		Indeterminate	1	1	–	–	2
TOTAL				527	875	587	259	2,258

[1] <1/4 in flakes and non-lithics deleted.

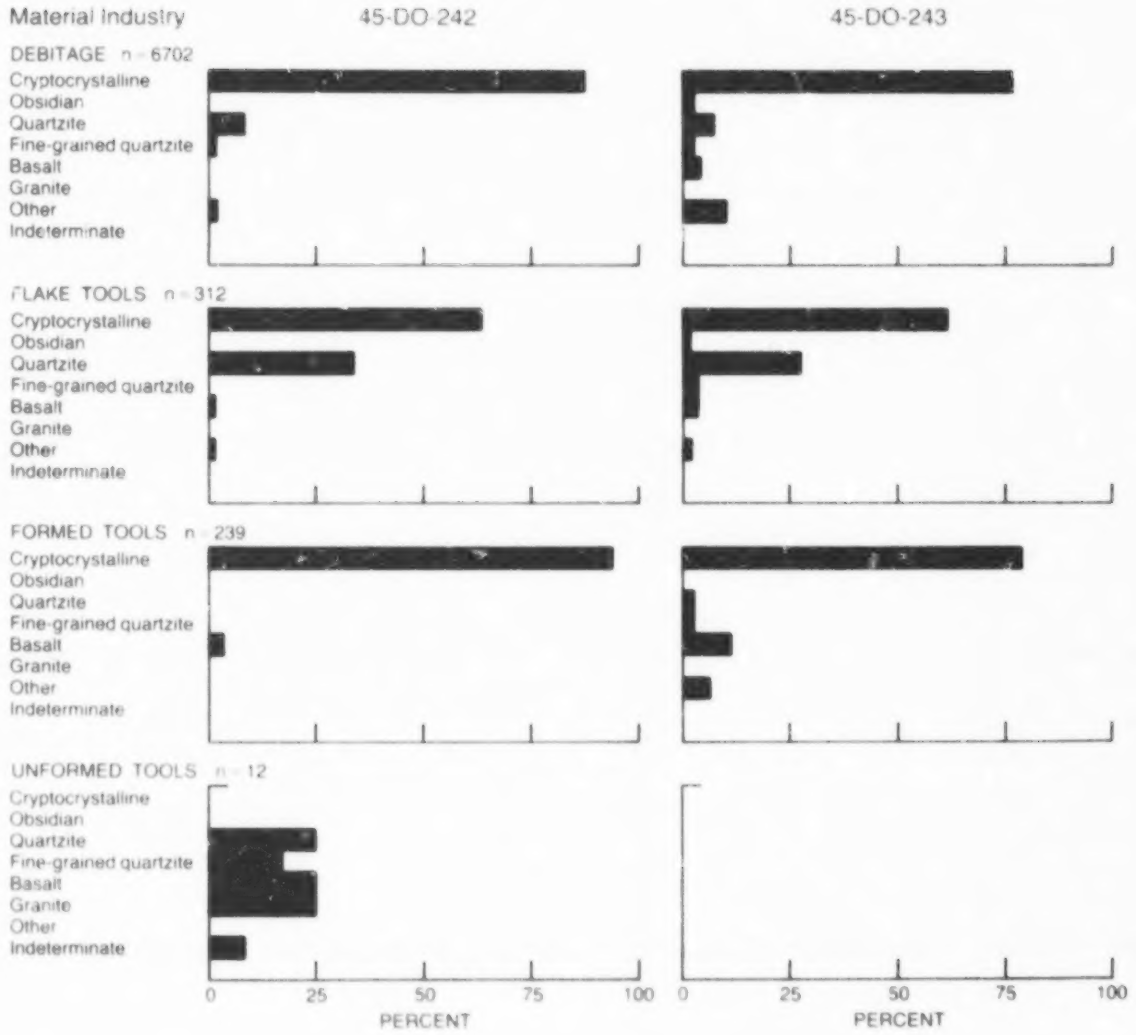


Figure 3-2. Relative percentages of material industries by major manufacturing and tool groups, 45-DO-242 and 45-DO-243.

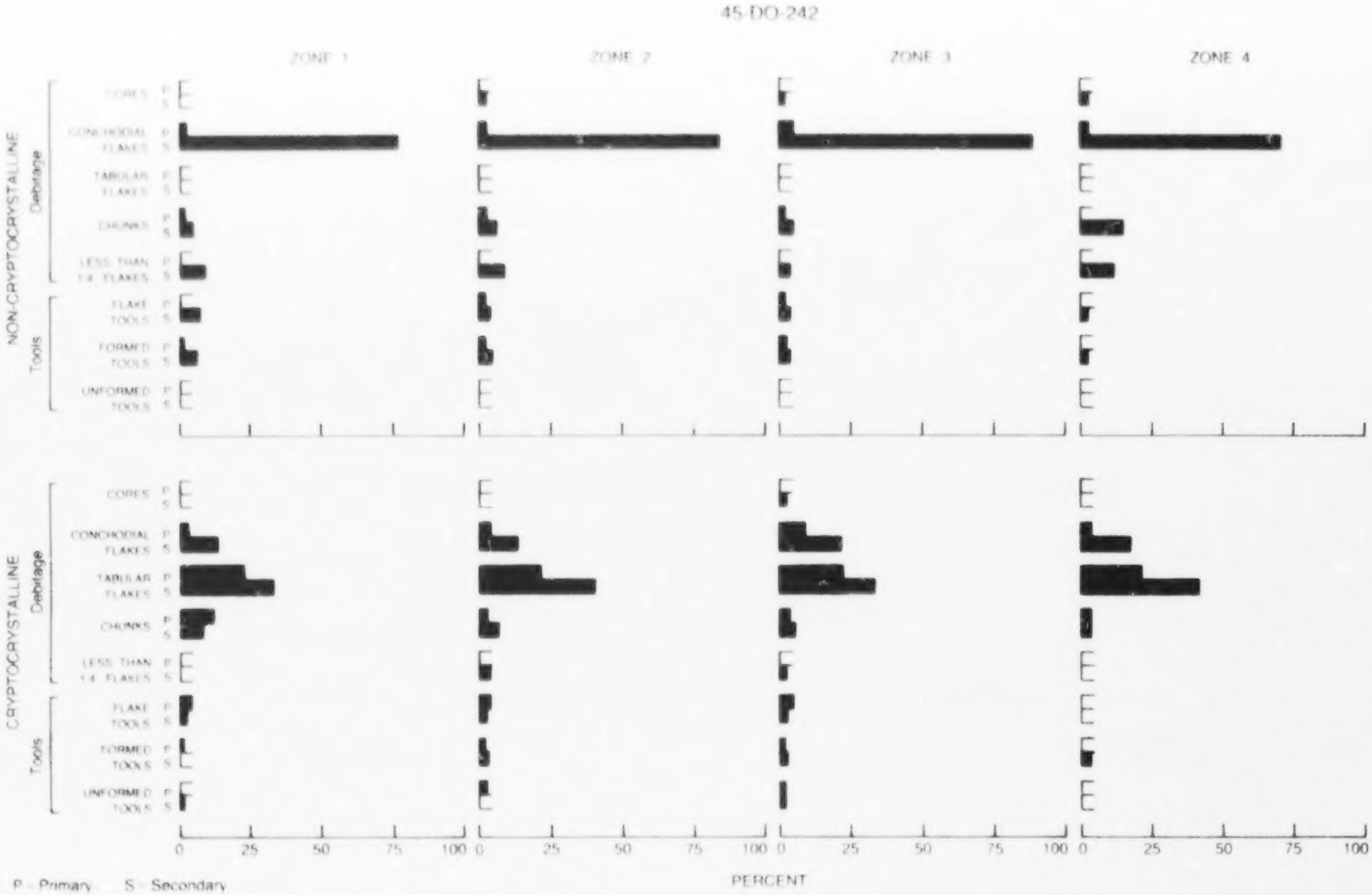


Figure 3-3. Attributes of cryptocrystalline and non-cryptocrystalline industries at 45-DO-242.

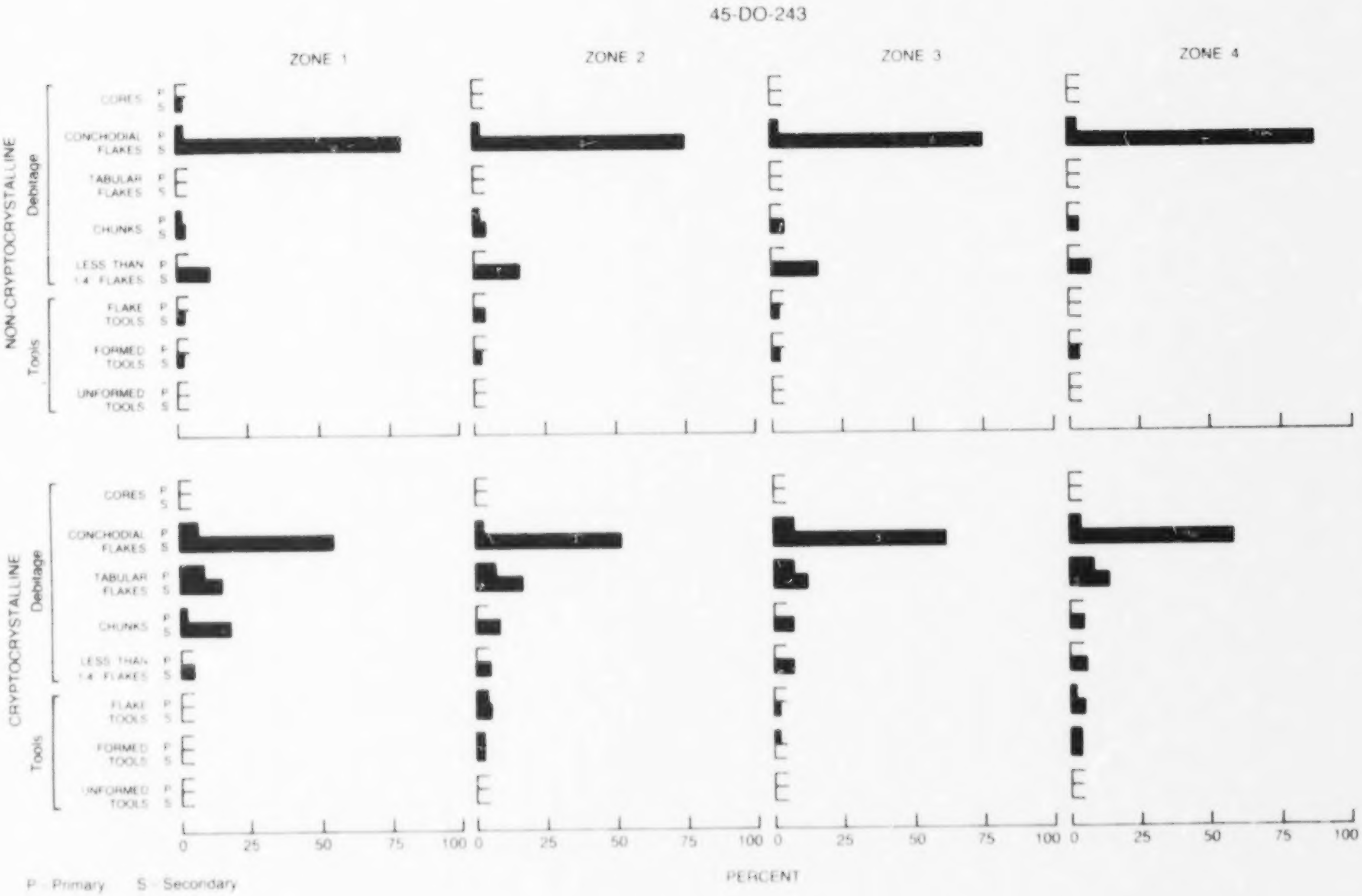


Figure 3-4. Attributes of cryptocrystalline and non-cryptocrystalline industries at 45-DO-243.

at 45-DO-242. Within the 45-DO-243 tool assemblage, it is also evident that flake tools, formed tools and unformed tools of non-cryptocrystalline stones are not as common as at site 45-DO-242.

In summary, it seems apparent that the most common method of tool production at both 45-DO-242 and 45-DO-243 was a generalized flake tool technology focused on the reduction of imported jasper and chalcedony nodules, cores and flakes for a broad range of functional tool types. Ancillary to this prevalent industry was the reduction of the locally available quartzite cobbles for a limited range of tool forms subsumed under the label of tabular knife. Both methods of tool production are very consistent over the span of occupation at both sites.

FUNCTIONAL ANALYSIS

Functional analysis examines the physical characteristics of artifacts in order to identify patterns of wear diagnostic of specific tool uses. Past research has pointed out the possibility of interpreting tool use by examining edge damage and general attrition of working surfaces (e.g., Hayden 1979; Stafford and Stafford 1979; Keeley 1978, 1974; Odell 1977; Crabtree 1973; Wilmsen 1968, 1970; Frison 1968; Semenov 1964). Wear patterns have been shown to reveal both the manner of tool use and the nature of the materials worked.

All artifacts were examined with a 10X hand-lens (cf. Hayden 1979; Stafford and Stafford 1979). During analysis, each artifact was classified as to tool shape, wear or surface damage, and edge angle. Making use of established correlations between specific wear patterns on certain materials and types of tool use, we can hypothesize the intended and actual use of collected tools. Most distinctions will be based on hardness--on the nature of edge attrition given softer and harder working mediums.

Ten classificatory dimensions are used to describe functional attributes: UTILIZATION-MODIFICATION, TYPE OF MANUFACTURE, MANUFACTURE DISPOSITION, CONDITION OF WEAR, WEAR/MANUFACTURE RELATIONSHIP, KIND OF WEAR, LOCATION OF WEAR, SHAPE OF WORN AREA, ORIENTATION OF WEAR, and EDGE ANGLE. The first five dimensions describe objects, the next four describe tools on objects, and the last describes variation within object/tool types through measurement of the working edges. Table 3-12 outlines these dimensions and constituent attributes.

Description will initially focus on functional object types. Object-specific dimensions will be used to introduce the occurrences of wear on functional object types. Tool-specific dimensions will outline the relationship of wear to manufacture and explicate the kinds of wear observed. Analysis will therefore proceed from the object to examination of tools on the object. Summary tables will deal with tools and the attributes of wear and manufacture which characterize them, rather than with simple descriptions of traditional, formal-functional categories.

Table 3-12. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

- None
- Wear only
- Manufacture only
- Manufacture and wear
- Modified/indeterminate
- Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

- None
- Chipping
- Pecking
- Grinding
- Chipping and pecking
- Chipping and grinding
- Pecking and grinding
- Chipping, pecking, grinding
- Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

- None
- Partial
- Total
- Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

- None
- Complete
- Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

- None
- Independent
- Overlapping - total
- Overlapping - partial
- Independent - opposite
- Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

- Abrasion/grinding
- Smoothing
- Crushing/pecking
- Polishing

DIMENSION VI: Continued

- Feathered chipping
- Feathered chipping/abrasion
- Feathered chipping/smoothing
- Feathered chipping/crushing
- Feathered chipping/polishing
- Hinged chipping
- Hinged chipping/abrasion
- Hinged chipping/smoothing
- Hinged chipping/crushing
- Hinged chipping/polishing
- None

DIMENSION VII: LOCATION OF WEAR

- Edge only
- Unifacial edge
- Bifacial edge
- Point only
- Point and unifacial edge
- Point and bifacial edge
- Point and any combination
- Surface
- Terminal surface
- None

DIMENSION VIII: SHAPE OF WORN AREA

- Not applicable
- Convex
- Concave
- Straight
- Point
- Notch
- Slightly convex
- Slightly concave
- Irregular

DIMENSION IX: ORIENTATION OF WEAR

- Not applicable
- Parallel
- Oblique
- Perpendicular
- Diffuse
- Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

- Actual edge angle

FUNCTIONAL OBJECT TYPES

A total of 687 worn or shaped stone objects were recovered from sites 45-DO-242 (N=552) and 45-DO-243 (N=135) (Table 3-13). These include a range of functional forms encompassing light, piercing and cutting tools, cruder, thicker, cutting and scraping tools, and heavy, chopping and pounding implements. Utilized flakes, unifacially and bifacially retouched flakes, bifaces, tabular knives and projectile points are the most frequent tool forms. Plates 3-1 through 3-5 illustrate selected artifacts from the two sites. Projectile points are illustrated later in the text under Stylistic Analysis. There is a remarkable consistency in the two site assemblages. Utilized and retouched flakes comprise 37.3% of the tool assemblage at 45-DO-242 and 36.3% of the total assemblage at 45-DO-243. Bifaces comprise 14.7% of the assemblage at 45-DO-242 and 12.6% of the assemblage at 45-DO-243. Projectile points make up 18.7% of the assemblage from 45-DO-242 and 12.6% of the assemblage from 45-DO-243. Tabular knives show greater variation, totalling 17.0% of the assemblage at 45-DO-243 and only 8.9% of the assemblage at 45-DO-242. The most significant difference between the two site assemblages, however, is the absence of hammerstones, hopper mortar bases and millingstones at 45-DO-243.

The two site assemblages may be compared by examining attributes of wear and manufacture on the recognized functional tool types. Table 3-14 lists functional types by occurrence of wear and wear/manufacture by analytic zone. As shown, 22.4% (N=144) of the tools from both sites show wear only, 35.5% (N=228) show a combination of wear and manufacture, 32.2% (N=207) have manufacture only, and the rest have either no manufacture or are classified as indeterminate (9.9%, N=63). Simple utilized flakes make up the majority of tool forms with wear only, comprising 24.6% of the total assemblage (N=168). Tool forms with manufacture only are primarily projectile points and projectile point fragments (50.2%, N=104), and bifaces (35.5%, N=73). Wear and manufacture is more evenly distributed across tool categories, but is most frequent in bifaces (11.0%, N=25), scrapers (14.5%, N=33) and tabular knives (30.7%, N=70). As a whole, the recorded tool forms reflect a broad range of potential functions, suggestive of site economies geared largely to hunting-butchering-processing of game, probably supplemented to some degree by plant collection and processing.

Nonlithic artifacts make up a small proportion of the total assemblage (Table 3-13). Because the functional analysis was designed to apply primarily to lithics, the nonlithic artifacts are summarized briefly here but are not discussed in the following sections. Nonutilitarian items include fragments of ochre, a bone bead (Figure 3-5;c), and several pieces of incised bone (Figure 3-5;d-g) among the objects recorded as indeterminate. Formed utilitarian objects include a shuttle (Figure 3-5;b), an awl (Figure 3-5;a), and a billet. Flaked long bones may have single or multiple flake scars on the margins. In some cases the flake scars may be due to fracturing of the long bone shafts with a rock; in other cases they may be due to wear from use of the edge as a tool.

Table 3-13. Functional object type by zone, 45-DO-242 and 45-DO-243.

Object Type	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Projectile point	6	12	24	–	42	3	1	4	2	10
Projectile point base	9	6	14	–	29	–	2	–	–	2
Projectile point tip	7	10	15	–	32	2	1	1	1	5
Biface	22	18	41	–	81	4	7	4	2	17
Chopper	1	2	4	–	7	–	1	3	3	7
Drill	2	3	5	–	10	–	1	–	–	1
Graver	–	2	2	–	4	–	–	–	–	–
Scraper	4	8	17	1	30	1	3	–	2	6
Shaft abrader	1	–	–	–	1	–	–	–	–	–
Tabular Knife	10	14	25	–	49	2	15	4	2	23
Bead	–	1	8	1	10	–	–	–	–	–
Hammerstone	1	4	3	–	8	–	–	–	–	–
Hopper mortar base	–	1	–	–	1	–	–	–	–	–
Millingstone	–	1	2	–	3	–	–	–	–	–
Burin spall	–	1	–	–	1	–	–	–	–	–
Linear flake	3	2	7	–	12	2	4	–	4	10
Core	–	2	3	1	6	1	2	–	–	3
Resharpening flake	1	1	2	–	4	–	2	–	–	2
Bifacially retouched flake	7	3	10	–	20	3	1	1	–	5
Unifacially retouched flake	17	10	23	–	50	1	4	1	–	6
Utilization only	26	30	75	1	132	11	17	5	3	36
Indeterminate	4	1	13	1	20	–	10	1	2	13
TOTAL LITHIC	121	132	293	5	552	29	61	24	21	135
NONLITHICS										
Shuttle	–	–	1	–	1	–	–	–	–	–
Awl	–	–	1	–	1	–	–	1	–	1
Billet	–	–	1	–	1	–	–	–	–	–
Flaked long bone	–	1	5	1	7	–	–	–	–	–
Bead	3	1	–	–	4	–	–	–	–	–
Indeterminate bone	4	4	29	1	38	–	3	2	2	7
Ochre	–	2	–	–	2	–	–	–	–	–
TOTAL NONLITHICS	7	8	37	2	54	–	3	3	2	8

KEY

Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.
22
Edge ground pebble
Test Pit 2/160A
Not known
Indeterminate

b.
88
Chopper
4N18W/FE21/50
2
Fine-grained basalt

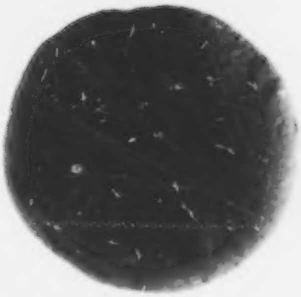
c.
463
Hammerstone
2N22W/70
2
Fine-grained quartzite

d.
275
Chopper
1N41W/110
3
Coarse-grained quartzite

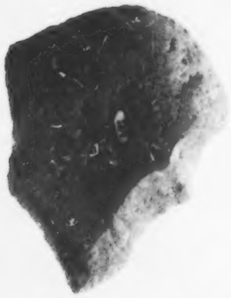
e.
570
Hammerstone
1N27W/FE37/165
3
Coarse-grained quartzite

f.
253
Core
2N42W/FE8/220
3
Basalt

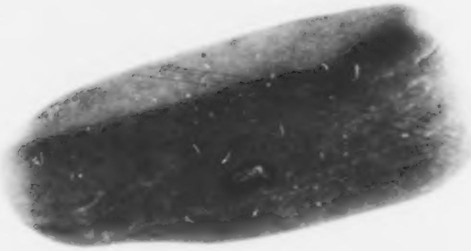
Plate 3-1. Cobble tools, 45-DO-242.



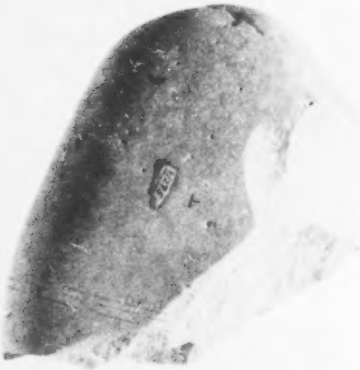
a



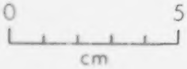
b

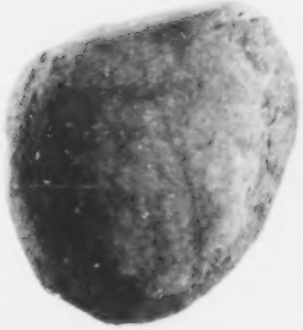


c

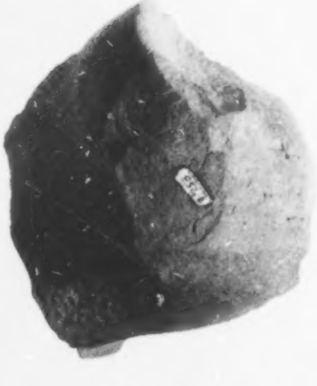


d





e



f

KEY
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.
135
Tabular knife
1N35W/40
1
Basalt

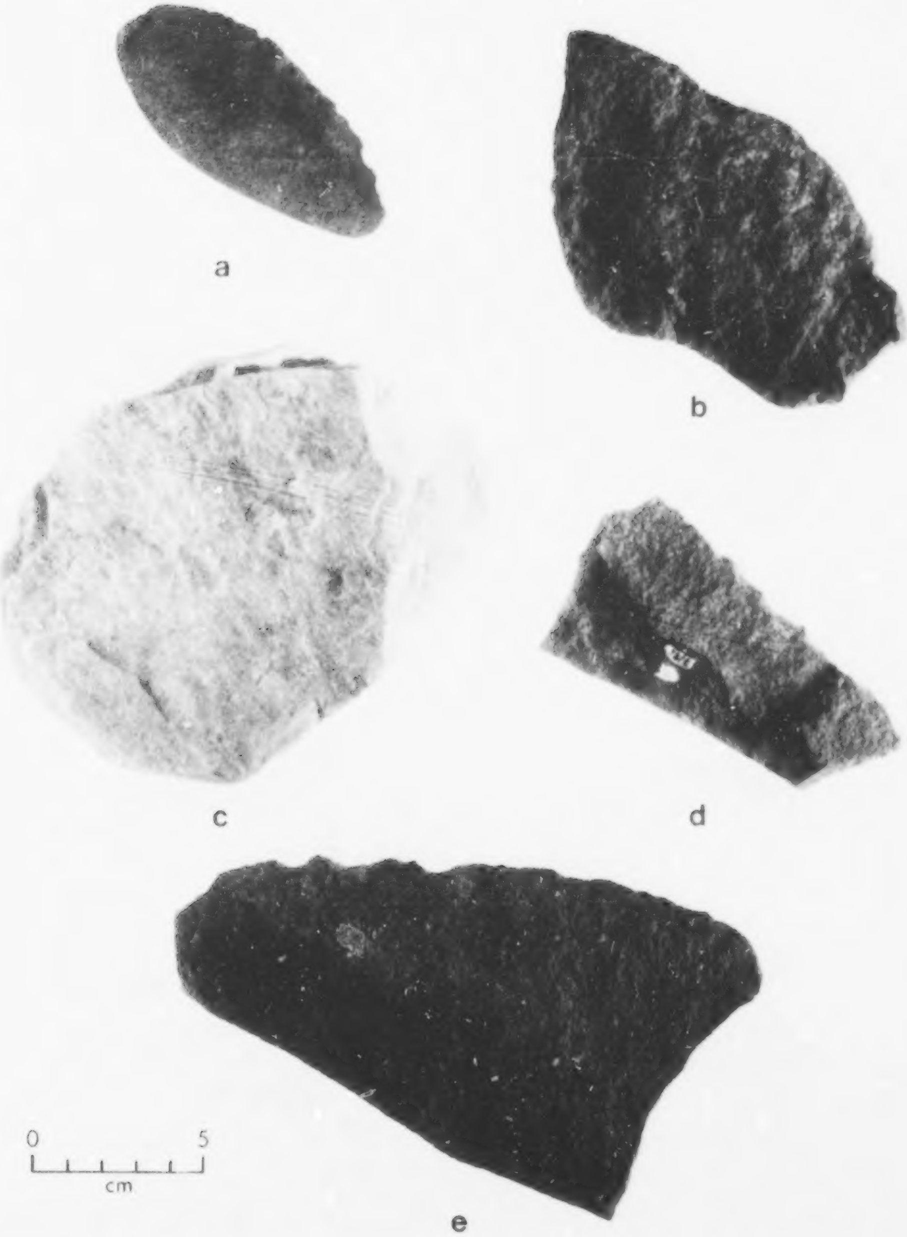
b.
98
Tabular knife
4N17W/30
1
Basalt

c.
24
Tabular knife
Test Pit 2/170A
2
Quartzite

d.
91
Tabular knife
4N18W/FE21/50
2
Indeterminate

e.
447
Tabular knife
0N28W/FE23/170
3
Basalt

Plate 3-2. Tabular knives, 45-DO-242.


a
b
c
d
0
5
cm
e

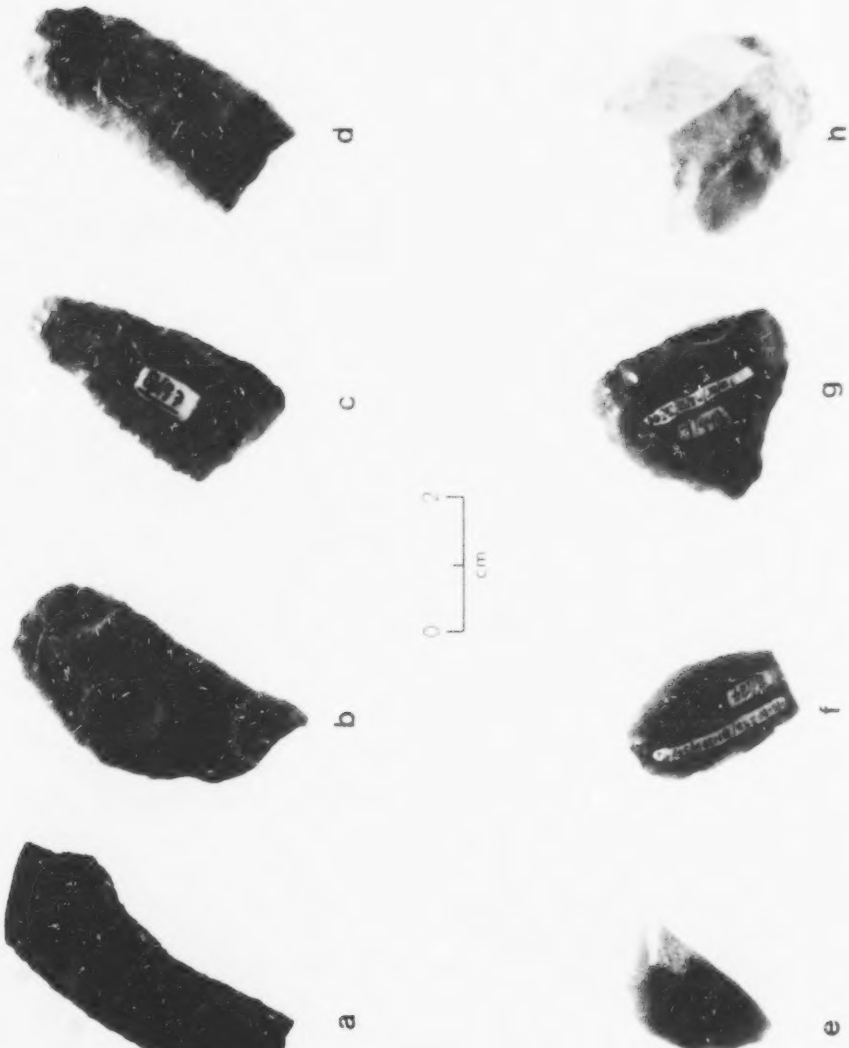
KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
45-DO-242	45-DO-242	45-DO-243	45-DO-242
395	307	97	446
Scraper	Scraper	Scraper	Scraper
3N6W/FE4/60	2N51W/FE8/50	10N21W/60	0N28E/FE23/170
2	3	4	3
Jasper	Jasper	Jasper	Jasper

e.	f.	g.	h.
45-DO-243	45-DO-243	45-DO-242	45-DO-242
105	184	442	519
Scraper	Scraper	Scraper	Scraper
8N10W/190	8N18W/50	0N28W/30	2N27W/FE13/UL10
4	2	1	1
Jasper	Opal	Jasper	Jasper

Plate 3-3. Scrapers, 45-DO-242 and 45-DO-243.


a
b
c
d
e
f
g
h
0
1
2
cm

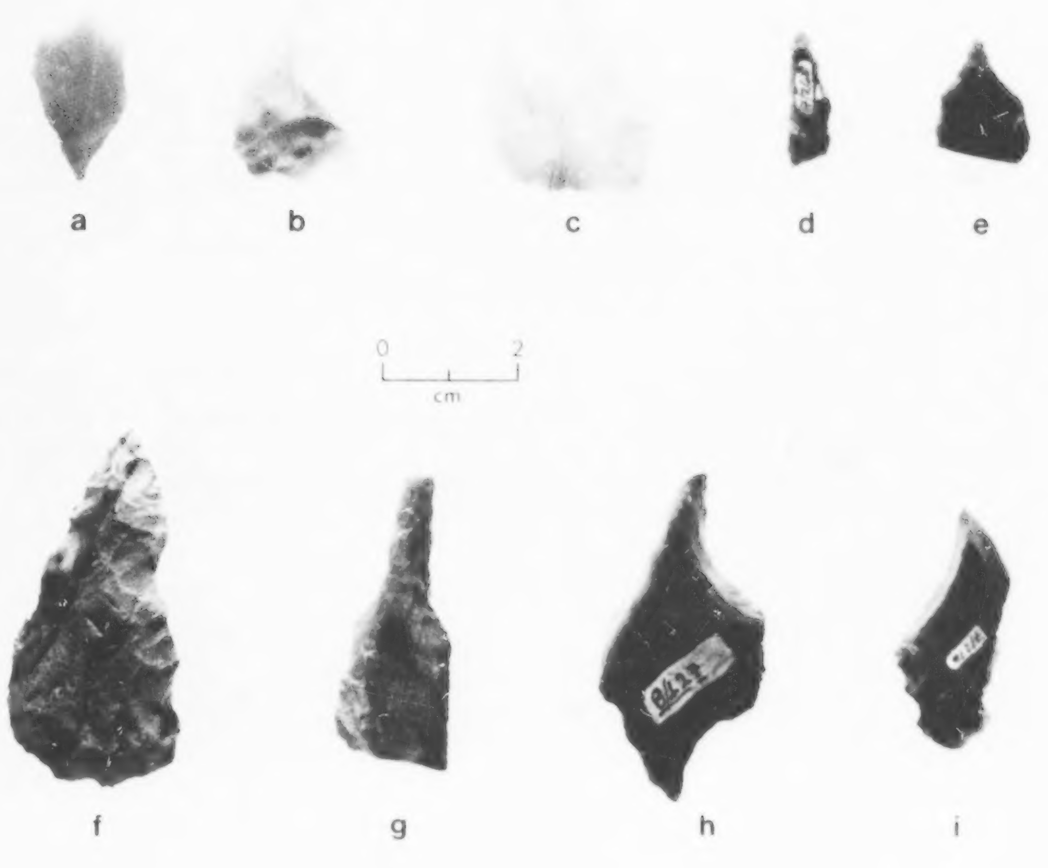
KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.
45-DO-242	45-DO-242	45-DO-242	45-DO-242	45-DO-242
10	15	25	265	482
Graver	Graver	Graver	Graver	Graver
Test Pit 2/50A	Test Pit 2/50A	Surface	2N31W/FEB/50	2N23W/70
2	1	1	3	2
Cryptocrystalline silicate	Cryptocrystalline silicate	Chalcedony	Jasper	Chalcedony

f.	g.	h.	i.
45-DO-242	45-DO-242	45-DO-243	45-DO-242
571	137	127	276
Drill	Drill	Drill	Drill
1N27W/FE37/170	1N35W/50	9N3E/40	1N3W/20
3	2	2	2
Silicized mudstone	Jasper	Jasper	Jasper

Plate 3-4. Gravers and drills, 45-DO-242 and 45-DO-243.


a
b
c
d
e
0
2
cm
f
g
h
i

KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.
45-DO-243
95
Core
10N2W/60
2
Jasper

b.
45-DO-243
111
Core
6N12W/50
1
Jasper

c.
45-DO-243
60
Core
6N21W/60
2
Jasper

d.
45-DO-242
604
Bead
2N29W/FE23/175
3
Indeterminate

e.
45-DO-242
603
Bead
2N29W/FE37/170
3
Indeterminate

f.
45-DO-242
329
Bead
3N41W/FE33/180
3
Indeterminate

g.
45-DO-242
468
Bead
2N21W/70
2
Coarse-grained quartzite

h.
45-DO-243
184
Tube bead
8N18W/50
3
Bone

i.
45-DO-242
622
Bead
4N25W/FE10/150
3
Steatite

j.
45-DO-242
604
Bead
2N29W/FE23/175
3
Indeterminate

k.
45-DO-242
80
Bead
2N22W/80
2
Bone/Antler

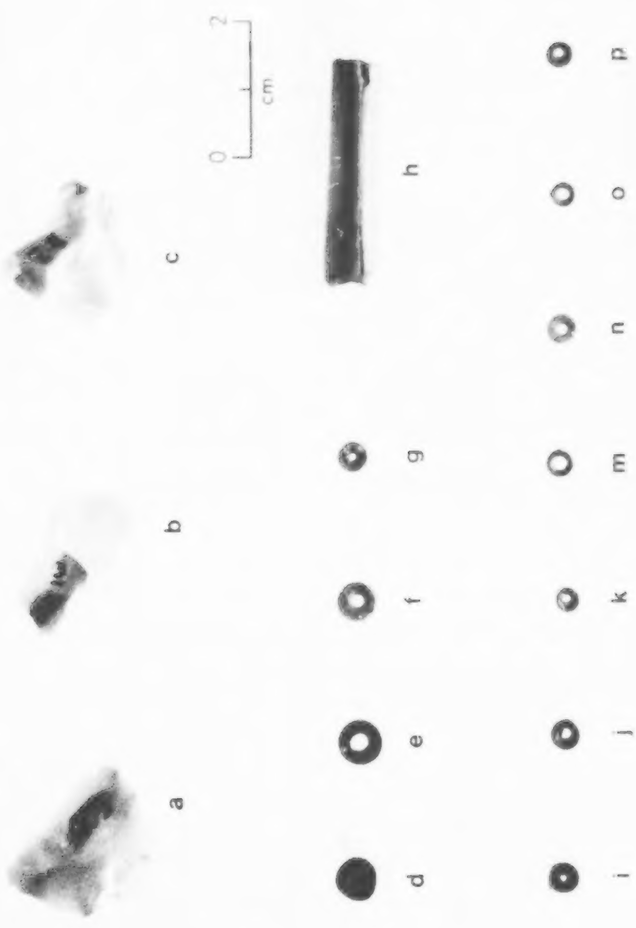
l.
45-DO-242
254
Bead
2N4W/FEB,18/230
3
Indeterminate

m.
45-DO-242
585
Bead
2N30W/110
3
Indeterminate

n.
45-DO-242
323
Bead
3N4W/FEB/160
3
Indeterminate

o.
45-DO-242
588
Bead
2N30W/175
3
Indeterminate

Plate 3-5. Cores and beads, 45-DO-242 and 45-DO-243.


a
b
c
0
cm
2
d
e
f
g
h
i
j
k
m
n
o
p

KEY

Site Number:
Master Number:
Provenience:
Zone:
Tool Type:

a.	b.	c.
45-DO-242	45-DO-242	45-DO-242
49	653	184
1N2E/50/F24	5N31W/100/F15	6N31W/20/F41
3	3	1
Awl	Shuttle	Bead

d.	e.	f.	g.
45-DO-243	45-DO-243	45-DO-242	45-DO242
178	185	410	420
11N20E/50	8N18E/120	3N5W/20/F2	3N5W/130/F8
2	3	1	3
Indeterminate	Indeterminate	Indeterminate	Indeterminate

Figure 3-5. Examples of nonlithic artifacts, 45-DO-242 and 45-DO-243.

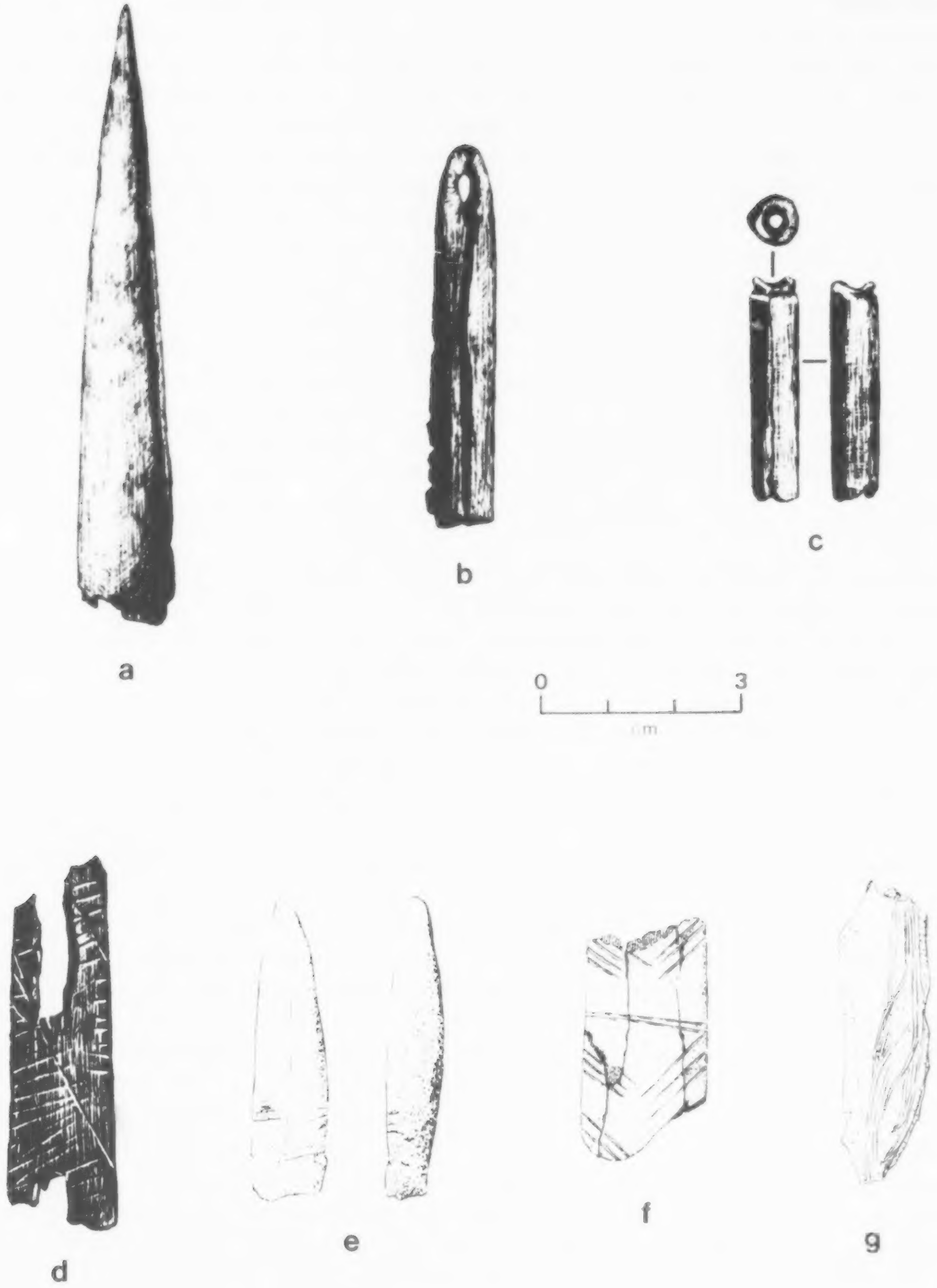

a
b
c
0
3
cm
d
e
f
g

Table 3-27. Dimensions of morphological projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE

N. Not separate
1. Side-notched
2. Shouldered
3. Squared
4. Barbed
9. Indeterminate

DIMENSION II: OUTLINE

N. Not applicable
1. Triangular
2. Lanceolate
9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

N. Not applicable
1. Straight
2. Contracting
3. Expanding
9. Indeterminate

DIMENSION IV: SIZE

N. Not applicable
1. Large
2. Small

DIMENSION V: BASAL EDGE SHAPE

N. Not applicable
1. Straight
2. Convex
3. Concave
4. Point
5. 1 or 2 and notched
9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

N. Not applicable
1. Straight
2. Excurvate
3. Incurvate
4. Reworked
9. Indeterminate

DIMENSION VII: CROSS SECTION

N. Not applicable
1. Planoconvex
2. Biconvex
3. Diamond
4. Trapezoidal
9. Indeterminate

DIMENSION VIII: SERRATION

N. Not applicable
1. Not serrated
2. Serrated
9. Indeterminate

DIMENSION IX: EDGE GRINDING

N. Not applicable
1. Not ground
2. Blade edge
3. Stem edge
9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

N. Not applicable
1. Not thinned
2. Short flake scars
3. Long flake scars
9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

N. Not applicable
1. Variable
2. Uniform
3. Mixed
4. Collateral
5. Transverse
6. Other
9. Indeterminate

Table 3-28. Morphological types.

Type	Description	Classification	Definition
1	Large Triangular	N 1 N 1	aA
2	Small Triangular	N 1 N 2	aA
3	Large Side-notched	1 N N 1	aA123, aA1234, aA12345
4	Small Side-notched	1 N N 2	aA123, aA1234, aA12345
5	Lanceolate	N 2 N N	aA
6	Shouldered Lanceolate	2 2 N N	aA, aA1, aA12
7	Large, Shouldered Triangular, contracting stem	2 1 2 1	aA, aA1
8	Small, Shouldered Triangular, contracting stem	2 1 2 2	aA, aA1
9	Large, Shouldered Triangular, non-contracting stem	2 1 (13) 1	aA12, aA123
10	Small, Shouldered Triangular, non-contracting stem	2 1 (13) 2	aA12, aA123
11	Large, Squared Triangular, contracting stem	3 1 2 1	aA1
12	Small, Squared Triangular, contracting stem	3 1 2 2	aA1
13	Large, Squared Triangular, non-contracting stem	3 1 (13) 1	aA12, aA123
14	Small, Squared Triangular, non-contracting stem	3 1 (13) 2	aA12, aA123
15	Large, Barbed Triangular, contracting stem	4 1 2 1	aA1
16	Small, Barbed Triangular, contracting stem	4 1 2 2	aA1
17	Large, Barbed Triangular, non-contracting stem	4 1 (13) 1	aA12, aA123
18	Small, Barbed Triangular, non-contracting stem	4 1 (13) 2	aA12, aA123

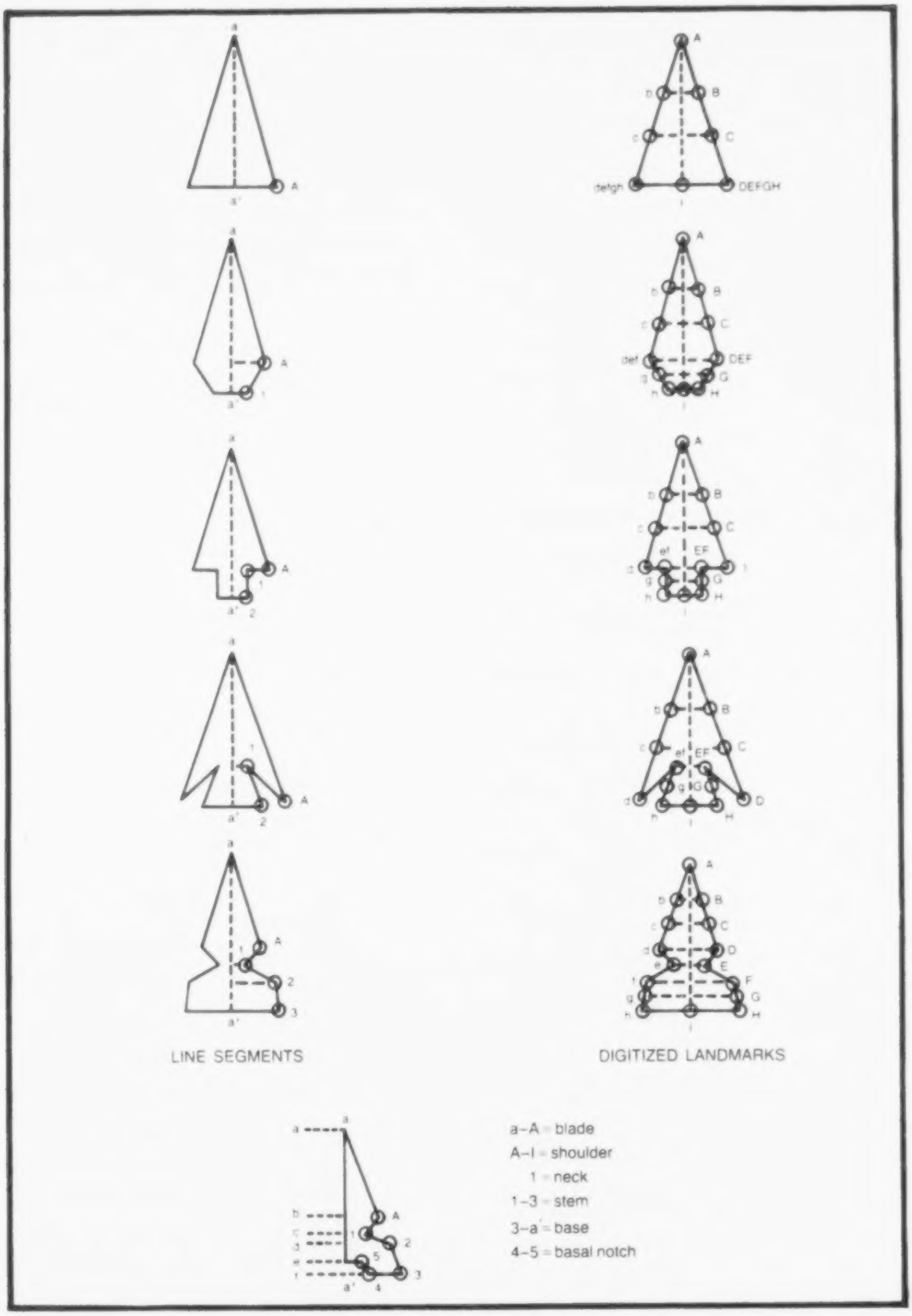

LINE SEGMENTS
DIGITIZED LANDMARKS
a
A
a'
1
2
3
4
5
b
B
c
C
d
D
e
E
f
F
g
G
h
H
i
def
DEF
ef
EF
defgh
DEFGH
a–A = blade
A–1 = shoulder
1 = neck
1–3 = stem
3–a' = base
4–5 = basal notch

Figure 3-1. Definition of projectile point outline.

Historical Classification

We have defined historical types on the basis of line and angle measurements in order to have a consistent classification method that utilizes published illustrations of projectile points. Other measurements, such as weight and thickness, were taken on projectile points in our collection, but problems of cost and efficiency precluded handling of specimens from other study areas. These measurements can be included in analysis of our points and, hence, for the definition of types and type variants that will correlate with acknowledged types, but they are not part of the initial typological exercise. Justification for this decision is found in prior research emphasizing the outline of projectile points as the basis of classification (Benfer 1967; Ahler 1970; Gunn and Prewitt 1975; Holmer 1978).

Our desire for a statistically derived classification led us to select a multivariate statistical method termed discriminant analysis (Nie et al 1975). In this analysis, individual specimens are sorted into selected groups on the basis of mathematical equations derived from analysis of cases with known memberships. First, we assembled representative specimens for each acknowledged historical type, and tested group autonomy through analysis of specified discriminating variables. Then, we used derived equations called discriminant functions to assign specimens in our collection to the statistically defined projectile point types. All cases are given a probability of group membership, calculated as the distance a given case score is away from a group score. Discriminating variables--those providing the most eparation between groups--are ranked and serve as type definitions. The outcome is a statistically defensible projectile point typology based on traditional, intuitively derived classifications. The resulting classification is consistent, and produces mathematically defined ranges of variability. It enables the researcher to quickly categorize a large collection. It also offers a sound, rational basis for definition of new types as well as an explicit definition of accepted types. We can thereby correlate the Rufus Woods Lake projectile point sequence with other chronologies in both a quantitative and qualitative manner. For a detailed discussion of procedures and assumptions involved in discriminant analysis see Johnson (1978) and Klecka (1980).

We assembled a type collection for the Columbia Plateau of over 1200 projectile points that constituted originally defined type examples, labeled specimens of recognized types, or type variants that were reasonably well dated. By critically reviewing the archaeological literature, we identified 23 historical types, which we arranged in six formal type series (Figure 3-2). We consistently applied distinctions based on the original type definitions, modified, where appropriate, by subsequent research. We routinely defined type variants, usually suggested by prior researchers, which segregate specimens according to diagnostic patterns in morphology. Historical types identified here represent a synthesis of projectile point types and cultural reconstructions postulated by researchers in different areas of the Columbia Plateau, and were not taken from any single typology or chronological sequence (e.g., Butler 1961, 1962; Nelson 1969; Leonhardy and Rice 1970).

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal-notched
	21 CASCADE A	14 WINDUST B		53 RABBIT ISLAND B	63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B	31 MAHKIN SHOULDERED			64 WALLULA Rectangular stemmed	74 COLUMBIA STEM B
	23 CASCADE C					75 COLUMBIA STEM C

Types are numbered consecutively within formal series: a two-digit code indicates the approximate temporal sequence of defined series and types.

Type names are those most commonly applied. Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area.

Figure 3-2. Historical projectile point types.

Names are usually those applied by the first researcher to define a specific type. We developed variant labels by using the accepted type name followed by a letter denoting diagnostic variation. For a complete discussion of procedures, see Lohse (1984g).

The 45-DO-273 Assemblage

The complete classification of projectile points from 45-DO-273 is presented in Appendix B, Table B-4. Thirteen projectile points are classified, including those labeled as projectile points and several labeled bases in the lithic analysis tables. Points fall into six morphological types and six historical types, with a minimum of one and a maximum of four members. The two classifications do not completely overlap, however. The relationship between morphological and historical types is shown in Table 3-29. Projectile points are illustrated in Plate 3-5 and the digitized outlines shown in Appendix B, Figure B-1.

Table 3-29. Relationship of morphological and historical projectile point types, 45-DO-273.

Historical Type		Morphological Type and Code						Total
Number	Name	1 N1NM	3 1NNM	5 N2NN	6 22NN	7 2121	10 2112	
	No historical type	1	–	–	–	–	–	1
21	Cascade A	–	–	2	–	–	–	2
23	Cascade C	–	–	2	–	–	–	2
31	Mahkin Shouldered Lanceolate	–	–	–	4	–	–	4
41	Cold Springs Side-notched	–	2	–	–	–	–	2
51	Nespelem Bar (?)	–	–	–	–	–	1	1
52	Rabbit Island A	–	–	–	–	1	–	1
Total		1	2	4	4	1	1	13

Projectile points are found in all zones at 45-DO-273, but in numbers too small for a meaningful discussion of percentage frequency distributions (Table 3-30 and 3-31). Nevertheless, a number of the projectile points' morphological characteristics have been selected for comparison, shown in Table 3-32. The selection of morphological characteristics is based on diversity. Dimensions D3 (stem-edge orientation), D6 (blade edge angle), D7 (cross section), D9 (edge grinding), and D10 (basal edge thinning) are excluded from the table because nine or more examples have the same characteristic, thus providing too little diversity for consideration. For

READEX FICHE best copy available

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

a.
400
1
-
2N15W/30
3
CCS

b.
519
3
Cold Springs Side-notched
3S17W/90
3
CCS

c.
132
3
Cold Springs Side-notched
5S26W/110
4
CCS

d.
272
5
Cascade A
1S13W/100
4
CCS

e.
554
5
Cascade A
3S21W/140
4
CCS

f.
408
5
Cascade A
1N16W/110
5
CCS

g.
10
5
Cascade C
Testpit 2/140
5
CCS

h.
487
6
Mahkin Shouldered Lanceolate
5N17W/0
1
CCS

i.
578
6
Mahkin Shouldered Lanceolate
3S28W/30
1
Basalt

j.
490
6
Mahkin Shouldered Lanceolate
5N17W/50
3
CCS

k.
434
6
Mahkin Shouldered Lanceolate
2N20W/60
3
CCS

l.
423
7
Rabbit Island A

2N17W/70
3
CCS

m.
349
10
Nespelem Bar

2N8W/40
2
CCS

Plate 3-5. Projectile points, 45-DO-273.

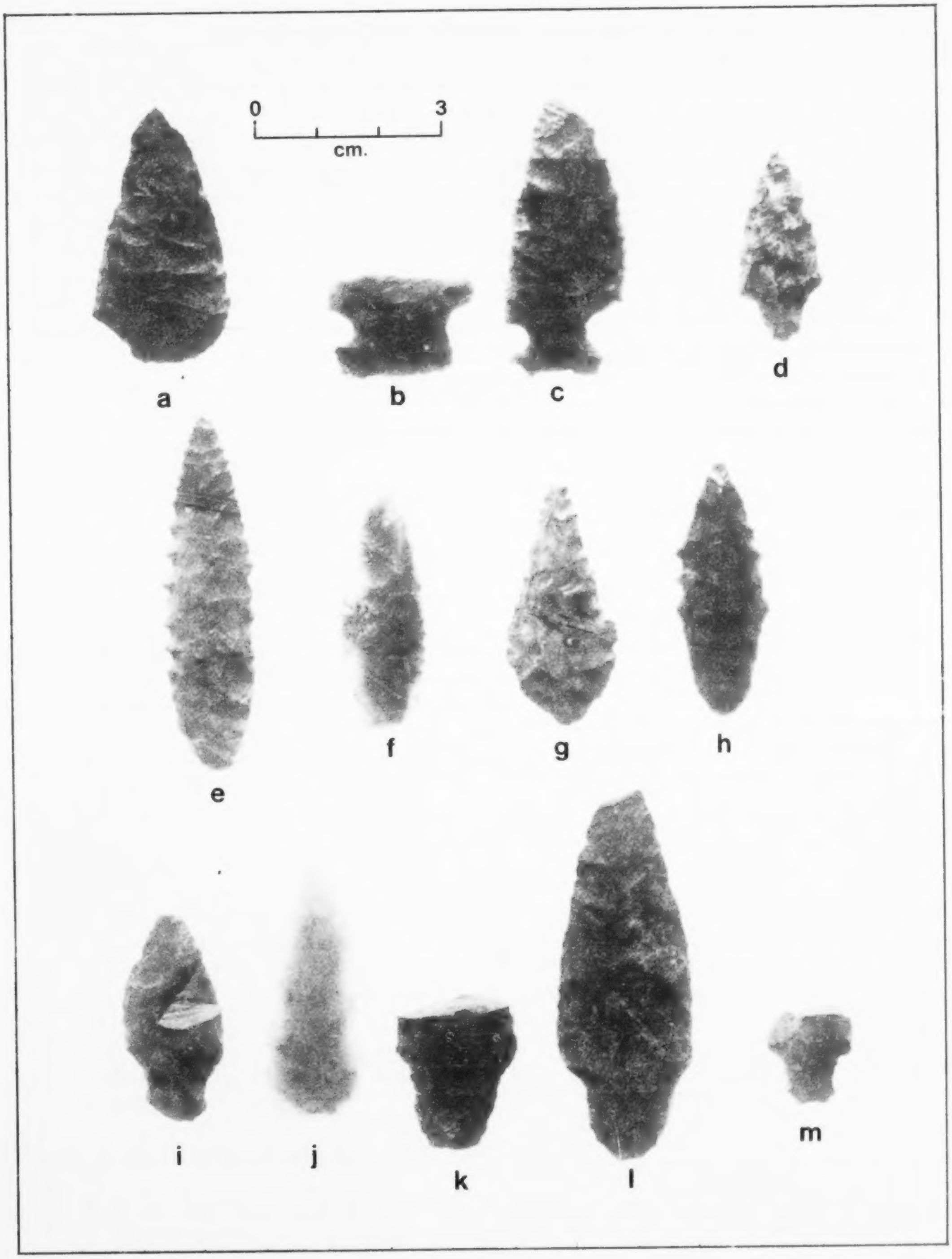

0
3
cm.
a
b
c
d
e
f
g
h
i
j
k
l
m

Table 3-30. Frequency of historic projectile points by zone, 45-DO-273.

Zone	Historic Type						Total
	Cascade A	Cascade C	Mahkin Shouldered Lanceolate	Cold Springs side-notched	Nespelem Bar[1]	Rabbit Island	
1	–	–	2	–	–	–	2
2	–	–	–	–	1	–	1
3	–	–	2	2	–	1	5
4	1	1	–	–	–	–	2
5	1	1	–	–	–	–	2

[1] Assignment questionable.

Table 3-31. Morphological projectile point types by zone, 45-DO-273.

Zone	Morphological Type and Code						Total
	1 N1N1	3 1NN1	5 N2NN	6 22NN	7 2121	10 2112	
1	–	–	–	2	–	–	2
2	–	–	–	–	–	1	1
3	1	2	–	2	1	–	6
4	–	–	2	–	–	–	2
5	–	–	2	–	–	–	2
Total	1	2	4	4	1	1	13

example, one projectile point has a planoconvex cross section and the remaining 12 points have biconvex cross sections.

Several trends are apparent in the change of morphological characteristics listed in Table 3-32. In Dimension 1, blade-stem juncture, unstemmed projectile points (i.e., lanceolate outline) are restricted to the lower three zones, and they occur in highest relative frequencies in Zones 4 and 5. Side-notched forms are found in Zone 3, while shouldered forms occur in Zones 1 through 3. The trend, then, is from unstemmed points in the earlier Kartar component to a diversity of forms, including side-notched specimens, in the late Kartar component. After that, projectile point frequencies and depositional problems preclude further comparison. All other dimensions follow a similar distribution. The four projectile ponts from the earlier Kartar component (Zones 4 and 5) almost always exhibit a single characteristic, while those of the Hudnut Phase (Zones 1 and 2) are more diverse. This is probably attributable to small sample error in the present assemblage, but the distribution of morphological characteristics listed in the table follows that suggested by other Columbia Plateau researchers (cf. Butler 1961, 1962; Nelson 1969; Leonhardy 1970; Leonhardy and Rice 1970; Rice 1969, 1972; Swanson 1962).

Historic projectile point types from 45-DO-273 are briefly discussed below, detailing possible correlates with types illustrated by other Columbia Plateau researchers. Metric attributes are listed in Table B-4, Appendix B.

Cascade A (21) N=2

These projectile points are broad, elongate Cascade types with variable flaking and cross section. One specimen, MN (Master Number) 272, has fine serrations on both edges. The blade of the other (MN 408) has been reworked with fine but irregular serrations. These are good examples of defined Cascade (or Vantage) forms, corresponding to type specimens illustrated by Butler (1962), Rice (1969, 1972), Leonhardy (1970), and Leonhardy and Rice (1970).

Cascade C (23) N=2

These projectile points are a little less regularly flaked than those of Type 21. Both points are also serrated, with fine serrations at the upper one-third of the blade and coarse serrations from there toward the base. One specimen (MN 554) has serrations almost to the base, while the other one (MN 10) is serrated to just below its midsection. These two projectile points are good examples of the forms assigned to the earlier Cascade subphase (ca. 8000-7000 B.P.) and illustrated by Rice (1972) and Leonhardy (1970).

Mahkin Shouldered Lanceolate (31) N=4

This is the most common historic type of projectile point recovered at site 45-DO-273. It consists of large to medium large, squat, slightly

Table 3-32. Selected morphological characteristics of projectile points by zone, 45-DO-273.

Zone	Blade/Stem Juncture			Outline			Size			Basal Edge Shape				Serration			Flake Scar Pattern					Zone Total
	Not Applicable	Side-notched	Shouldered	Triangular	Lanceolate	Indeterminate	Not Applicable	Large	Small	Straight	Convex	Concave	Indeterminate	Not Serrated	Serrated	Indeterminate	Variable	Uniform	Mixed	Collateral	Indeterminate	
	N	1	2	1	2	9	N	1	2	1	2	3	9	1	2	9	1	2	3	4	9	
1	-	-	2	-	2	-	2	-	-	-	2	-	-	2	-	-	1	-	-	1	-	2
2	-	-	1	1	-	-	-	-	1	-	1	-	-	-	-	1	1	-	-	-	-	1
3	1	2	3	3	2	1	2	4	-	2	2	1	1	4	-	2	-	1	3	-	2	6
4	2	-	-	-	2	-	2	-	-	-	1	-	1	-	2	-	-	-	-	2	-	2
5	2	-	-	-	2	-	2	-	-	-	2	-	-	-	2	-	1	-	-	1	-	2
Total	5	2	6	4	8	1	8	4	1	2	8	1	2	6	4	3	3	1	3	4	2	13

shouldered lanceolate forms with variable outlines and flaking patterns. The only projectile point made from basalt found at the site is in this class. This is not a well-defined type elsewhere on the Plateau, although comparable specimens have been found scattered throughout Cascade (or Vantage) and Tucannon (or Frenchman Springs) assemblages (Rice 1969, 1972; Leonhardy 1970; Nelson 1969; Greengo 1982; Grabert 1968). Frequencies of these points appear to increase in assemblages on the upper Columbia River (cf. Nelson 1969; Chance and Chance 1982; Sanger 1970; Lohse 1984g). Since no suitable type definition is available, we named these specimens Mahkin Shouldered. The definition is based on a large number of specimens recovered in the project area (Lohse 1984g). They appear to represent an early form transitional from the defined Cascade to the defined Rabbit Island series. They are likely ancestors of the smaller, shouldered triangular points that are common in the late Frenchman Springs (our Hudnut) phase.

Cold Springs Side-notched (41) N=2

Two projectile points were identified as Cold Springs Side-notched. They are large side-notched forms with a lanceolate outline and variable cross section. These indicate a late Cascade (or Vantage) subphase affiliaton, sometime after the 7000 B.P. date given to the Mt. Mazama eruption, and characteristic of the Cold Springs Horizon (Butler 1962, 1965). This type, as presently defined, is a large, variable class of related forms. Illustrated examples (Rice 1965, 1969, 1972; Leonhardy 1970; Butler 1962; Nelson 1969; Leonhardy and Rice 1970) include a variety of forms with triangular to lanceolate outlines, collateral to variable flaking, and well-defined side notches and squared basal margins to slight lateral indentations and rounded basal margins. Both specimens from this site appear to be projectile ponts. Infrequent in our project area and in excavations along the Middle and Upper Columbia, it is not possible for us to assess accurately the temporal distribution of these forms at this time.

Nespelem Bar (51) N=1

A frequent type in the Rufus Woods Lake project area, this variant of the Rabbit Island Stemmed projectile point type, like the Mahkin Shouldered Lanceolate type discussed above, is not well documented in the Columbia Plateau as a whole. Isolated examples are fairly common, however, and are usually classified as variants of the Rabbit Island Stemmed type (e.g., Nelson 1969; Swanson 1962; Greengo 1982). These specimens are thick, squat, triangular forms with slightly to well defined, sloping shoulders and contracting, rounded stems. The point from 45-DO-273 is broken approximately half way along the blade. It was originally defined as a morphological type 10: small, shouldered triangular , non-contracting stem projectile point (Plate 3-5;m). Apparently, digitizing of this specimen deemphasized the true nature of the stem, and the point was assigned to historical type 51. This assignment is questionable (compare illustration in Plate 3-5 with computer plotted outline in Figure 3-2). The specimen does not closely resemble those illustrated by Rice (1969, 1972), Nelson (1969), Greengo (1982), and Chance and Chance (1982).

Rabbit Island B (52) N=1

The recovered projectile point is a medium large, thick, triangular form with a contracting stem and rough serrations. This type of point is characteristic of the Frenchman Springs phase defined by Swanson (1962) and Nelson (1969). Infrequent in collections from the Lower Columbia and Snake River regions, where they are occasionally found in Tucannon phase assemblages with Columbia Corner-notched forms, this type is considered as characteristic of the period from about 4000-2000 B.P. Comparable specimens are illustrated by Nelson (1969), Swanson (1962), Rice (1969, 1972), and Greengo (1982).

The percentage frequency distribution of historical types by zone is shown in Table 3-30. These types are the same for the lowest two zones. After that, a change occurs in Zone 3 towards more diversity and different historical types. Zone 2 includes a single projectile point of a different type from zones below it. Zone 1 yielded only two projectile points from a redeposited matrix.

Only limited chronological inferences can be drawn from the projectile points at 45-DO-273. Numbers of points per type and per zone are very low and sample size does play a role in relative frequency distributions. Second, there are only two radiocarbon dates, both from Zone 4 (see Chapter 2). However, these two dates of approximately 1000 B.P. do not correlate with the known chronological position of Cascade lanceolate projectile points determined at other sites in the project area (i.e., 45-OK-11, Lohse 1984f) and on other areas of the Plateau, as pointed out in the discussion of historical types above. These dates may date Zone 2 but not Zones 3 through 5, unless we completely disregard the historical projectile point typology and the Mazama ash deposition from Zone 5.

The Mazama tephra from Zone 5 dates it to approximately 6500 B.P. The similarity of projectile points in both morphological characteristics and historical types suggests a similar date for Zone 4. Small sample error makes this a tenuous assignment acceptable only because data to the contrary is absent. These two zones, then, are the oldest Kartar components recovered in the Rufus Woods Lake project area.

Projectile points from Zone 3 include two Mahkin Shouldered Lanceolate, two Cold Springs Side-notched, one Rabbit Island B, and one triangular point that may be a blank. The Mahkin Shouldered points are found scattered throughout Cascade-Vantage-Kartar and Tucannon-Frenchman Springs-Hudnut phases, as elaborated above in the type discussion. Cold Springs Side-notched, the most diagnostic point type from this zone, is restricted to late Cascade-Vantage-Kartar phase along the Columbia River. Rabbit Island B projectile points are characteristic of the Frenchman Springs-Hudnut phase and are also found in the Tucannon phase of the Lower Columbia-Snake River region. The triangular point is not restricted to particular phases.

Based on four of the six projectile points, Zone 3 represents a late Kartar phase component. This interpretation is supported by data from the well-dated Component A from site 45-OK-11 (Lohse 1984f). This component, dated from 5400 to 4200 B.P., includes Cascade, Mahkin Shouldered Lanceolate, and Cold Springs Side-notched projectile points. Cascade points are absent from Zone 3 of 45-DO-273. Their occurrence as the only point type in the lower zones may indicate that they served a specific function, thus explaining their absence from Zone 3, but their presence and absence in the varicus zones may be due to sampling error. The singular Rabbit Island B point may have been redeposited from a later use of the site.

Only one projectile (MN 349) point is from Zone 2. This broken specimen is included in Morphological Type 10 and in Historical Type 51, Nespelem Bar Stemmed. Both classifications are problematical because the stem is of a configuration that is difficult to characterize (see Plate 3-5), depending on where along its outline primary emphasis is placed. The sides of the stem are contracting, parallel, and diverging depending on whether it is viewed near the shoulder, the middle, or the base of the stem. For this reason, the point is classified as straight stemmed in the morphological classification and ccntracting stemmed in the historical classification (see Appendix B, Table B-1). Furthermore, visual inspection shows the projectile point to be similar to many small, shouldered, triangular specimens with expanding stems that have been dated from 2500 to 500 B.P. at other project sites (i.e., 45-DO-214, Miss 1984a; 45-DO-285, Miss 1984b; 45-OK-2/2A, Campbell 1984b; 45-OK-250/4, Miss 1984c; 45-OK-258, Jaehnig 1983a).

The problematical stem shape, large time span, and very small sample size of this projectile point preclude a valid component assignment for Zone 2. If the projectile point is assumed to be a reliable time indicator, then two radiocarbon dates from Zone 4 of approximately 1000 B.P. could be from carbonized material redeposited from Zone 2 to Zone 4. However, field excavators did not record evidence for this redeposition. Therefore, Zone 2 will not be assigned to a phase, but we suggest that it may be a component of the Coyote Creek. phase.

Zone 1 includes two Mahkin Shouldered Lanceolate projectile points. They are assigned to the late Kartar phase, as discussed above, and we assume they are redeposited. Evidence for redeposition is both geological (see Chapter 2) and cultural (see technological analysis, above).

SMALL LINEAR FLAKES

Previous sections on technological and functional analyses cite small linear flakes without referring to them as **microblades**. This section presents data to show that most of these flakes are indeed microblades as defined by other researchers.

Several researchers, including Borden (1950), Munsell 1968, Browman and Munsell (1969), and Sanger (1968,1970), have discussed microblade industries on the Columbia Plateau. Sanger (1968:95, 1970:106) suggests that microblade cores provide the best evidence of the industry. Where cores are absent, an assemblage of small parallel-sided flakes in which more than 25% of the specimens have a trapezoidal cross section (evidence of successive flake removal) may be considered evidence of a microblade technology. At site 45-DO-273, the site assemblage includes two microblade cores, one core fragment, and 104 small, linear flakes which examination suggests are microblades.

Microblades are illustrated in Plate 3-3;e-m, and one microblade core is shown in Plate 3-3;n. Metric attributes are represented in Table 3-33. Microblade core metric and nonmetric attributes are shown in Table 3-34. A comparison of Table 3-33 with metric attributes of microblades published by Sanger (1968:114 and 117, Tables 1-3 and 10-11) shows that those from 45-DO-273 are generally shorter but as wide and thick as those from Sanger's sites. The number of blades from our site is also much larger. Microblade core data from 45-DO-273 compares favorably with that presented by Sanger (1968:116, Table 6; 117, Table 9), given the small number of complete cores from our site. It is interesting to note that the dimensions of microblade cores from 45-DO-273 (Table 3-34) correspond closely to those from Ryegrass Coulee (Dunsell 1968, Table 20, p.128) with the difference that striking platforms on the Ryegrass Coulee specimens tend to be a little shorter.

Table 3-33. Metric dimensions of microblades, 45-DO-273.

Category	Statistic	Length (mm)	Width (mm)	Thickness (mm)
All microblades	Range	5.8-23.8	2.5-9.3	0.5-3.1
	$\bar{x}$	12.40	5.78	1.31
	s.d.	3.87	1.51	0.44
	n	104	104	104
Complete microblades only	Range	7.8-23.4	2.7-9.0	0.5-3.1
	$\bar{x}$	13.60	5.68	1.34
	s.d.	3.78	1.56	0.49
	n	51	51	51

Table 3-34. Dimensions and attributes of microblade cores, 45-DO-273.

Zone	Master Number	Striking Platform		Core Height (mm)	Core Edge Angle (degrees)	Number of Flutes	Flute Width Range (mm)	Remarks
		Length (mm)	Width (mm)					
2	184	36	15	20	81	3	2-4	-
3	266	18	13	19	65,70,91	11	1.5-8	Conchoidal flake off microblade core
3	161	NA	NA	NA	4	4	1.5-6	-
$\bar{x}$		27	14	19.5	76.3	6		

SUMMARY

The technological, functional, and stylistic analyses of lithics from 45-DO-273 have been presented and discussed in this chapter. Results of the technological analysis show that numbers of objects made from cryptocrystalline material (CCS) vary inversely with numbers of quartzite objects from Zone 4/5 to Zone 1. This change through time is statistically significant, indicating that flintnappers changed their preference in materials or the function of the site changed through time. A change of lithic technology is also reflected by a decrease in size of flakes from the lower to the uppermost zone. This decrease in size occurs despite the decrease in objects made from CCS (CCS tends to generate smaller and more numerous flakes than all other materials).

Basalt, a locally available material, yields the highest relative frequency of primary debitage and the highest frequency of implements. Therefore, we apparently have evidence of the complete manufacturing sequence of basalt implements which were made without extensive secondary reduction. Quartzite, also available at the site, included more secondary reduction than basalt. The complete manufacturing sequence of quartzite implements also took place at the site. Cryptocrystalline material was apparently transported to the site from a source some distance away. Primary reduction took place, in part, elsewhere, but secondary reduction was carried out extensively at the site. Some tertiary modification of CCS objects also took place here.

Our functional analysis data indicates that a relatively low percentage of objects were manufactured. Of these, all but a few, of indeterminate manufacture, were flaked. An examination of object use shows that the number of wear areas per formed object increased from Zone 4/5 to Zone 1 while those of modified objects decreased at the same time. Worn areas are nost frequent on drills, gravers, scrapers, hammerstones, utilized only objects, and shaft abraders. Tabular knifes, bifacially retouched objects, and unifacially retouched are next in frequency of use, followed by projectile points, bifaces, choppers, and peripherally flaked cobbles. Microblades are have the lowest number of recognizable wear areas per object.

Wear areas on objects indicate that scraping and, to a lesser extent, cutting of materials of intermediate hardness, such as wood, were the tasks most frequently performed by the site's occupants. Less frequently, they scraped soft materials, such as hide, and hammered hard objects, such as stone, or softer objects placed on stone. The use of the projectile points for hunting implements is inferred from their breakage patterns. Other activities, such as chopping, also were done. Of course, our functional analysis may well have missed other uses of the recovered objects.

Projectile points and small linear flakes were subjected to stylistic analyses. A total of 13 points were grouped into six morphological types with a minimum of one and a maximum of four members each. These low frequencies made chronological placement of zones difficult, particularly in view of the two problematical radiocarbon dates. However, three projectile point styles represented at the site are relatively reliable chronological indicators serrated lanceolate points; large, side-notched points; and shouldered lanceolate projectile points. The lanceolate projectile points date Zone 4/5 to Cultural Period I, while associated Mazama tephra deposits date this zone at about 6500 BP. Shouldered lanceolate projectile points in Zone 3 indicate that this is a component of Cultural Period II or III, and the associated large, side-notched points date the cultural materials more precisely to 4500 B.P. Zone 2 has been assigned provisionally to Cultural Period VII because of one projectile point and two dates that were recovered out of context below this zone. Projectile points indicate that redeposited Zone 1 is of the same age as Zone 3.

4. FAUNAL ANALYSIS

Faunal remains from archaeological sites provide a source of data on the ecology and historic biogeography of animal species living in the area, and on their utilization by human occupants. This chapter describes the faunal assemblage recovered from 45-DO-273, and summarizes the implications of the assemblage for understanding the archaeology of the site.

THE FAUNAL ASSEMBLAGE

The faunal assemblage from this site consists of a total of 1,087 bone fragments weighing 485 g. Of these fragments, only 87, slightly more than 8% of the sample, are identifiable. All of the identified specimens are mammalian. The relatively small proportion of identifiable fragments indicates the highly fragmented nature of the sample. Nine shell fragments weighing 31 g were recovered. Shell materials have not been identified. The distribution of counts and weights of vertebrate and invertebrate faunal remains among zones is shown in Table 2-2. Taxonomic composition and distribution of vertebrate remains for the site as a whole and by zone are presented in Table 4-1.

The following summarizes the elements identified for each taxon. Where necessary, criteria used to identify the specimens are included, as well as remarks concerning past and present distributions of the taxa and the possible cultural significance of taxa.

SPECIES LIST

MAMMALS (NISP=87)

Marmota cf. flaviventris (yellow-bellied marmot) -- 2 elements.

All marmot remains have been assigned tentatively to the species _M. flaviventris_ on the basis of present distribution; this species is the only marmot now living in the project area and is a common resident of talus slopes. _M. monax_ has been recorded in extreme northeastern Washington and _M. calagata_ occurs in the Cascades to the west of the project area (Ingles 1965; Dalquest 1948). The three species are indistinguishable on the basis of osteological morphology, and the size ranges of the three overlap extensively. The possibility of changes in distrubution or cultural transport of animals preclude dismissing the possible occurence of one or both of the more montane species in this assemblage.

Marmots were small game for ethnographic
inhabitants of eastern Washington (Ray 1932; Post 1938). Their presence in this faunal assemblage may indicate prehistoric use.

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-DO-273.

Taxa	Site Total		Zone									
			1		2		3		4		5	
	NISP	MNI	NISP[1]	MNI[2]	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
MAMMALIA												
Sciuridae												
Marmota cf. flaviventris	2	1	-	-	-	-	1	1	1	1	-	-
Spermophilus sp.	1	1	-	-	-	-	1	1	-	-	-	-
Geomyidae												
Thomomys talpoides	55	10	1	1	13	1	11	2	17	4	13	3
Heteromyidae												
Perognathus parvus	4	2	-	-	-	-	3	1	-	-	1	1
Cricetidae	3	-	-	-	3	-	-	-	-	-	-	-
Lagurus curtatus	8	6	8	5	1	1	-	-	-	-	-	-
Canidae												
Canis sp.	6	1	6	1	-	-	-	-	-	-	-	-
Cervidae												
Cervus elaphus	1	1	-	-	1	1	-	-	-	-	-	-
Odocoileus sp.	6	1	5	1	1	1	-	-	-	-	-	-
Total	87	-	20	-	19	-	16	-	18	-	14	-

[1] NISP=Number of identified specimens.
[2] MNI=Minimum number of individuals.

Spermophilus spp. (ground squirrels) -- 1 element.

Three species of ground squirrels are currently found in eastern Washington: *Spermophilus columbianus*, *S. washingtoni*, and *S. townsendii*. *S. columbianus* is larger than the other two and prefers more mesic habitats. *S. washingtoni* and *S. townsendii* are smaller and prefer sagebrush and grass zones to the south and east of the project area (Dalquest 1948:268; Ingles 1965:169). These elements could not be assigned to species. Ground squirrels have been reported as a food resource in the ethnographic literature (Ray 1932:82).

Thomomys talpoides (northern pocket gopher) -- 55 elements.

Thomomys talpoides is the only geomyid rodent recorded in the project area. There is very little evidence that they were utilized prehistorically or ethnographically. Because pocket gophers burrow, their presence in this assemblage is probably the result of natural processes.

Perognathus parvus (great basin pocket mouse) -- 4 elements.

Perognathus parvus is the only heteromyid rodent recorded in the project area. Like the pocket gophers, P. parvus is most likely present as a result of natural processes.

Cricetidae (New World rats and mice) -- 3 elements.

Lagurus curtatus (sagebrush vole) -- 9 elements.

The sagebrush vole generally inhabits dry sagebrush habitat which is sparsely grassed (Maser and Storm 1970:142). Only cranial material of this genus is readily distinguished from Microtus on osteological bases (Grayson 1981). L. curtatus is probably present in this assemblage as a result of natural processes.

Canis spp. (wolves, coyotes, and dogs) -- 6 elements.

Both Canis latrans (coyote) and C. familiaris (domestic dog) are common in the project area today. C. latrans is an indigenous species, and C. familiaris has great antiquity in the northwest (Lawrence 1968). C. lupus (wolf) was a local resident in the past but has been locally extinct since about 1920 (Ingles 1965). It was not possible to determine the species represented by these specimens, but all fall within the size range of the coyote/dog; all elements are too small to represent the larger wolf.

Odocoileus spp. (deer) -- 6 elements.

These materials may represent one or both of two species of deer (O. hemionus and/or O. virginianus), but it was not possible to make species-level identifications on any of the recovered elements.

Deer were an important food resource to indigenous peoples of eastern Washington (Post 1938; Ray 1932). While none of the recovered elements displayed evidence of human intervention, such as butchering marks, these elements probably entered the site as a result of human activities.

Cervus elaphus (elk) -- 1 element.

Cervus elaphus, while once widespread across most of the forest areas of eastern Washington, became extinct locally about A.D. 1910 (Dalquest 1948:391). They have been reintroduced to parts of northeastern and southeastern Washington in historic times.

Remains of elk have been recovered from many archaeological sites in eastern Washington and occur throughout the Holocene. They were taken by indigenous peoples. While the single recovered specimen displays no evidence of human intervention, the bone probably owes its presence in the assemblage to human activity.

DISCUSSION

The collection of vertebrate remains from 45-DO-273 is small, but representative of fauna expected in the project area. All identified taxa live in the project area at present or lived there in early historic times. None of the identified elements were burned, and none displayed evidence of human intervention in the form of butchering marks. On the basis of faunas recovered from the other sites in the project area, it seems safe to speculate that the sciurid (ground squirrels and marmots), canid (dog and/or coyote) and artiodactyl (deer, elk) bones are present because of human activity. Further, deer, elk, marmot, and squirrel, were part of the diet of the native people living in the project area as recorded in ethnographies.

Seasonality data is limited to the inferences that may be made from the presence of two marmot elements (one each in Zones 3 and 4). Marmots (*Marmota flaviventris*) estivate from late June and may pass directly into hibernation in August. They do not reappear until some time in February or March (Dalquest 1948; Ingles 1965). This suggests that Zones 3 and 4 may have formed sometime from March through July. The small sample size, however, limits our confidence in this inference (Monks 1981).

5. FEATURES ANALYSIS

During excavations at 45-DO-273, 35 features were recorded in the field. Some of these represented natural strata and are not considered in the features analysis. Others were found to be redundant and combined, or inconsequential and discarded. The remaining cultural features were classified according to a two-tiered classification (described in Campbell 1984d) which considers, on the one level, feature provenience, shape, and patterning; and, on the second level, the abundance of various material contents. By combining the information of the paradigmatic classes with information on the size and absolute material counts, we have classified the features into functional types. These types are broadly defined as housepits, firepits, other pits, exterior occupation surfaces, and debris scatters. At 45-DO-273, fire-modified rock scatters, possible firepits, and a single log constitute the cultural features. The types of features are extremely limited when compared to all the feature types recorded by the project. This indicates that the cultural occupations of 45-DO-273 probably were limited in terms of frequency and duration and that they did little to alter the surface of the site.

ZONE 3

Two features are recorded in Zone 3 (Figure 5-1), a cluster of stone tools and a decomposing log. The latter may be a naturally deposited piece of driftwood.

A concentration of lithic artifacts (Feature 12) was found in the southeast corner of 3S21W (Figure 5-1). A chopper, peripherally flaked cobble, utilized flake, and six pieces of debitage make up the feature; no charcoal or staining was observed. The concentration, which covered an area 75 x 20 cm, did not extend into the unit adjacent to the east.

A decomposing log (Feature 23) was exposed *in situ* across the northeast quadrant of 2S18W (Figure 5-2). The log was in varying stages of decay, ranging from intact chunks of wood to dark flecks in the sand matrix. It measured 1.5 m long. A microblade, 37 flakes, three unidentified bone fragments, and a single basalt fire-modified rock were recovered as part of this feature. Elsewhere in the unit, material counts are also slightly higher than in surrounding levels.

ZONE 2

Two groups of fire-modified rocks make up the features of Zone 2 (Figure 5-2). They occur in the same geologic stratum roughly a meter apart horizontally.

A group of four fire-modified granite rocks (Feature 11) form a rough semicircle in the southeast corner of 1N16W. The rest of the circle was not uncovered in the excavations of 0N16W. This feature may represent an eroded hearth area, or may be the result of redeposition. Other fire-modified rocks

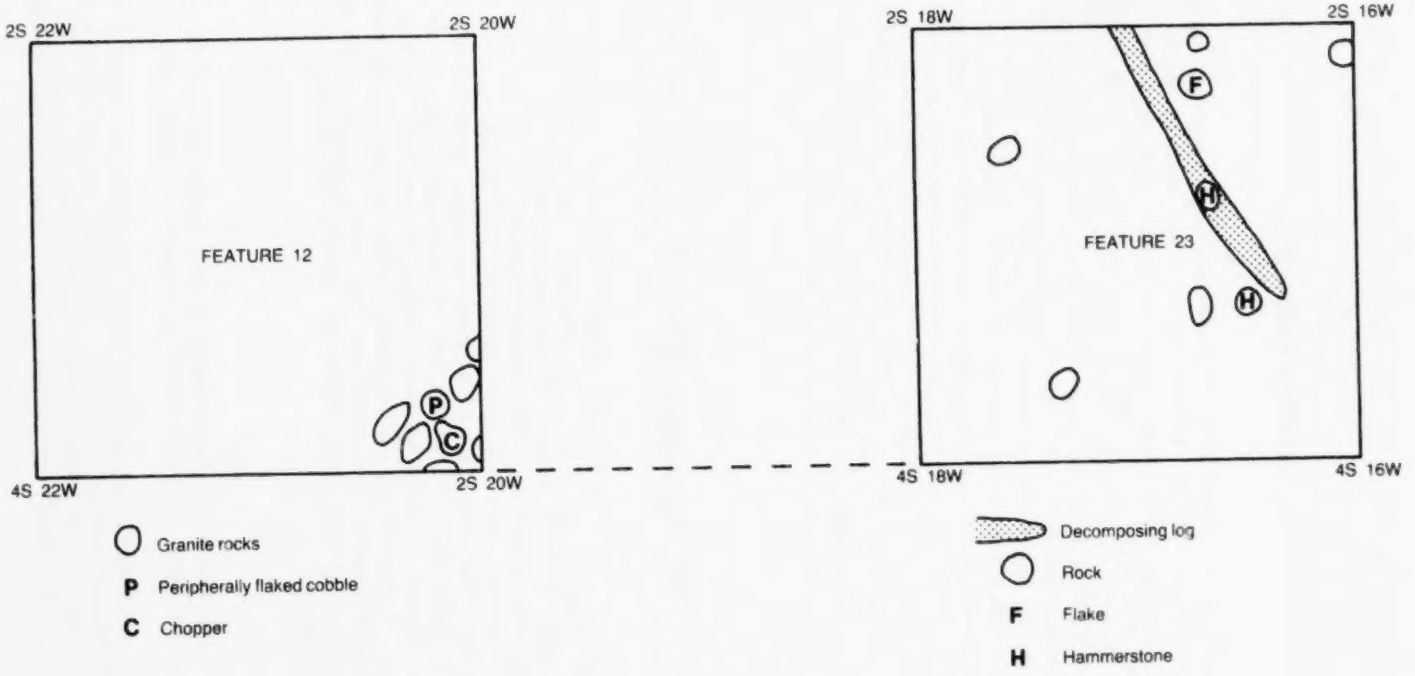

2S 22W
2S 20W
FEATURE 12
4S 22W
2S 20W
Granite rocks
P Peripherally flaked cobble
C Chopper
2S 18W
2S 16W
FEATURE 23
4S 18W
4S 16W
Decomposing log
Rock
F Flake
H Hammerstone

Figure 5-1. Location of Features 12 and 23, Zone 3, 45-DO-273.

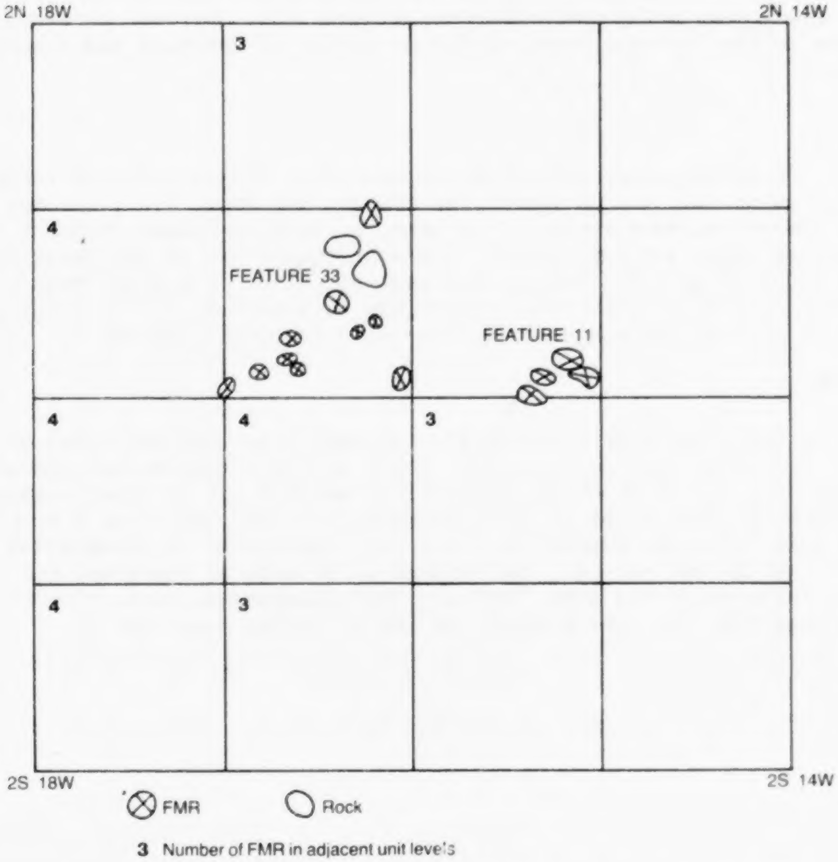

2N 18W
2N 14W
3
4
FEATURE 33
FEATURE 11
4
4
3
4
3
2S 18W
2S 14W
FMR
Rock
3 Number of FMR in adjacent unit levels

Figure 5-2. Location of Features 11 and 33, and counts of FMR in the vicinity, Zone 2, 45-DO-273.

occur in similar quantities in units nearby (see Feature 33). Nine flakes also were collected from this cluster of FMR.

The second scatter of FMR (Feature 33) in Zone 3 is a "content" feature; that is, it consists solely of the material collected and does not include any soil, staining, or other artifacts which may also have occurred within the defined area. It was defined by the site director after excavation had ended. Laboratory analysis confirmed that the number of fire-modified rocks in Unit Level 10 of 1N17W was unusually large for the site as a whole; therefore, the 1 x 1-m square was designated a feature (Figure 5-2). Fifteen fire-modified rocks make up the feature, along with four pieces of debitage and a bone fragment.

ZONE 1

Only one feature was identified in this zone (Figure 5-3). A large concentration of rock and fire-modified rock on and among the disturbed beach sand was designated Feature 27. A scraper, a flake, one bone fragment and 15 fire-modified rocks were collected. The exposed portion of the features measures 100 x 75 cm. The feature has been subjected to a great deal of disturbance, including downslope erosion and wave action, so its original function is unclear, although it may represent remnant firepits.

DISCUSSION

The cultural features at 45-DO-273 represent two distinct kinds of activity, including tending fires and lithic artifact manufacture and/or use. The decomposing log is an enigma because the maximum age of dated undecomposed wood in other project sites is approximately 2500 B.P., and Zone 3 probably dates to 4500 B.P. (see Chapter 3). The log, therefore, is redeposited, probably in an animal burrow. The absence of structural features, and the low number of features at the site, indicate that occupations were of short duration, and that the site probably served a limited function.

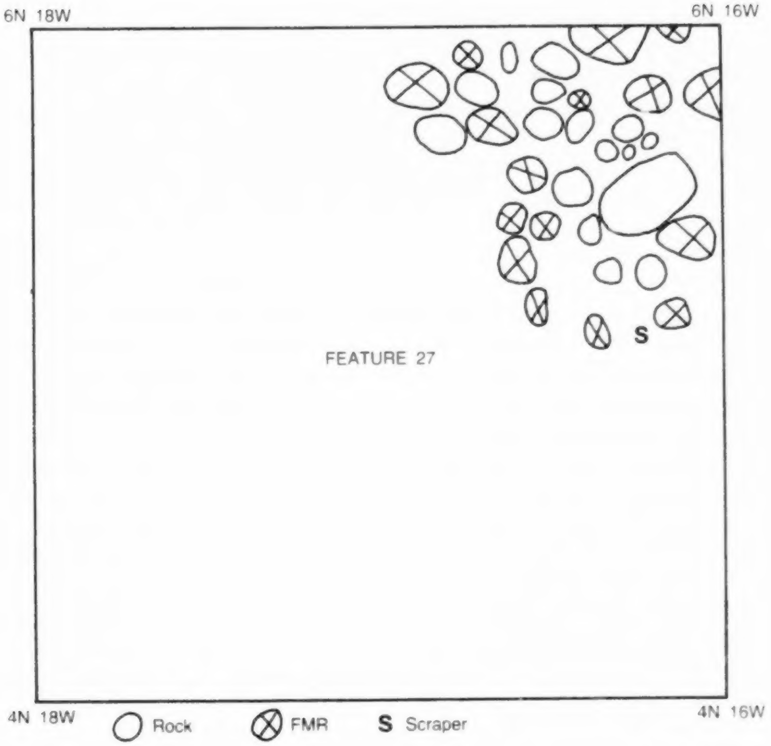

6N 18W
6N 16W
S
FEATURE 27
4N 18W
Rock
FMR
S Scraper
4N 16W

Figure 5-3. Location of Feature 27, Zone 1, 45-DO-273.

6. SYNTHESIS AND INTERPRETATION

This chapter presents a short discussion of all analyses of data from 45-DO-273. Most of the information cited here is summarized from previous chapters on stratigraphy and chronology, artifacts, features, and archaeofaunal analysis. New data are presented on artifact distributions.

GEOCHRONOLOGY

The earliest cultural occupation (Zone 5), is on or in a Columbia River point bar deposit (DU I). The age of the point bar can only be inferred indirectly from geological and archaeological evidence. Alluvial fan deposits (DU II), including Mazama tephra, cover the bar in the vicinity of the site. We have argued in Chapters 2 and 3 that this tephra although redeposited, probably dates the lower part of the alluvial fan to about 6500 B.P. The point bar, then, must predate that. On the other hand, lanceolate projectile points in the upper point bar deposit are similar in age to points in the lower part of the alluvial fan. We infer, then, that the point bar buildup ended just before alluvial fan deposits began covering the bar.

It is suggested that the point bar, Allen Bar, became inactive approximately 6000 years ago. Buildup of the bar may have ceased when an almost vertical granitic outcrop approximately 60 m high prevented the river about one km upstream from continuing to erode the outside of a bend.

At approximately 6000 B.P., an alluvial fan covered the downriver part of Allen Bar at the location of the site. This fan was deposited by rapidly moving waters sweeping down from the slopes behind the bar. This indicates that seasonal run-off occurred, perhaps intermittently, over a long period of time.

In DU III, alluvial fan deposits are interbedded with Columbia River overbank or lesser fan deposits. Cultural materials in these deposits include materials from both Zones 3 and 2. Zone 3 is dated to approximately 4500 B.P. by the presence of Cold Springs Side-notched points, and Zone 2 tentatively dated to 1000-1500 B.P. by a single point.

Depositional Unit IV, including the cultural material of Zone 1, apparently postdates the construction of Chief Joseph Dam. The flood deposits, at least, may be the result of the great flood of 1948. Interbedded aeolian deposits perhaps date to the "dustbowl" days of the 1930 Is and, in part, may also be the result of modern dryfarming practices on the Columbia Plateau.

Evidently, alluvial fan buildup continued for at least 2,000 years following 6000 B.P. and perhaps for as long as 5,000 years. The relatively thin deposit, however, indicates that this buildup occurred very infrequently.

Moreover, it was interrupted repeatedly by overbank deposits laid down by the Columbia River. In addition, the blocky soil structure described in Table 2-1 shows that soil development took place during this time, suggesting a moister climate.

Thus, both the alluvial fan buildup and the *in situ* development, suggest a climate considerably moister than it is now. The repeated overbank deposits may reflect conditions upriver in the Columbia's drainage basin. Both the intermittent nature of the deposits and the soil genesis further suggest that these processes were intermittently active.

CULTURAL CHRONOLOGY

Because the zonal association of two radiocarbon assays is problematical, the temporal placement of cultural components at 45-DO-273 is based primarily on a stylistic analysis of projectile points. At least three components are represented at the site. Zone 4/5 is assigned to the Kartar Phase (before 6000 B.P.) because of the presence of lanceolate points found in association with Mazama ash. Zone 3 is a later Kartar Phase component dating to approximately 4500 B.P. Zone 2 is tentatively dated at 1500 to 1000 B.P., which places it in the Coyote Creek Phase. Zone 1 is also in the Coyote Creek Phase but includes redeposited materials that may be part of the same component as Zone 3.

These data indicate the site was occupied intermittently for approximately 5,000 years. Although separated by thousands of years, the components lie in close vertical proximity to each other. It is possible that culture-bearing deposits of intermediate age have been deflated, or that conditions between occupations were not conducive to human habitation at the site. Our information does not allow us to choose between the alternatives, but it would be interesting to determine if the same conditions that influenced site deposition also influenced decisions by the prehistoric inhabitants of the area about site occupation.

SEASONALITY

The number of cultural remains, particularly the relative scarcity of artifacts and features in comparison with other sites in the project area, suggest that the site was occupied for very short periods of time and, possibly, only during certain seasons. The meager data on seasonality consists of two marmot bones, one from Zone 3 and one from Zone 4. Since marmots are only available from February to late June, the site may have been occupied at that time during Kartar Phase times.

FAUNAL REMAINS

A total of 86 identified skeletal elements represent nine species. Four of these, including pocket mice, pocket gophers, New World rats and mice, and sagebrush voles, are natural inclusions.

Squirrels, marmots, deer-sized ungulates, elk, and canids, represented by only 16 identified elements, are probably part of the cultural assemblage. The canid remains, found in Zone 1, are not considered in the following discussion because they may represent dogs that would not have been hunted, even if they were part of the diet. The small number of bones of probable game animals makes zonal comparisons extremely unreliable. However, it is interesting to note that squirrels and marmots are restricted to Zones 3 and 4/5, the Kartar Phase components, while deer-sized animals and elk are found only in the Coyote Creek components, Zones 1 and 2.

The presence of fresh water shellfish remains in the Kartar Phase components and their virtual absence from the Coyote Creek component is also noteworthy (Table 2-2). Again, these remains occur in very small numbers in the lower zones.

The differences in animal remains between the Coyote Creek and the Kartar components suggest that either the site was occupied during different seasons in these periods or that a change in site function occurred. Since indicators of seasonality are present only in the lower zones, this first interpretation lacks adequate support. The other hypothesis rests on the assumption that squirrels and marmots may have been more readily available near the site, while the large mammals which would avoid the site would have to be hunted afar. The paucity of data, however, insures that this remains only a speculation.

ARTIFACT DISTRIBUTIONS

The following distributional data of selected artifact groups is presented to determine location of activity areas, such as artifact manufacturing stations and/or food processing areas. The exact determination of activity areas for this site is difficult because excavation units cover too small a horizontal area to define the activity areas rigorously. Nor do we venture to discuss Zone 1 because it includes redeposited material. Also, the reader should be aware that our method of conflating all excavated levels pr zone creates the illusion that we are dealing with buried occupation surfaces. This may not be the case, and care has to be taken when the distributional data are interpreted. Despite the simplification inherent in this data manipulation, we believe that tentative conclusions can be drawn.

In presenting this data, all numbers are totals for 2 x 2-m units and all excavated levels within each zone. High concentrations mentioned in the text are based on comparison among all zones, rather than each zone separately. Thus, Zone 4/5 has no high concentrations because only small numbers of lithics, bone, and fire-modified rock (FMR) occur per unit in comparison with other zones.

ZONE 4/5

Distributions of artifacts in Zone 4/5 are shown in the first five figures. Figure 6-1 presents the distribution of all lithics. No concentrations are apparent, but lithics are present in all units that

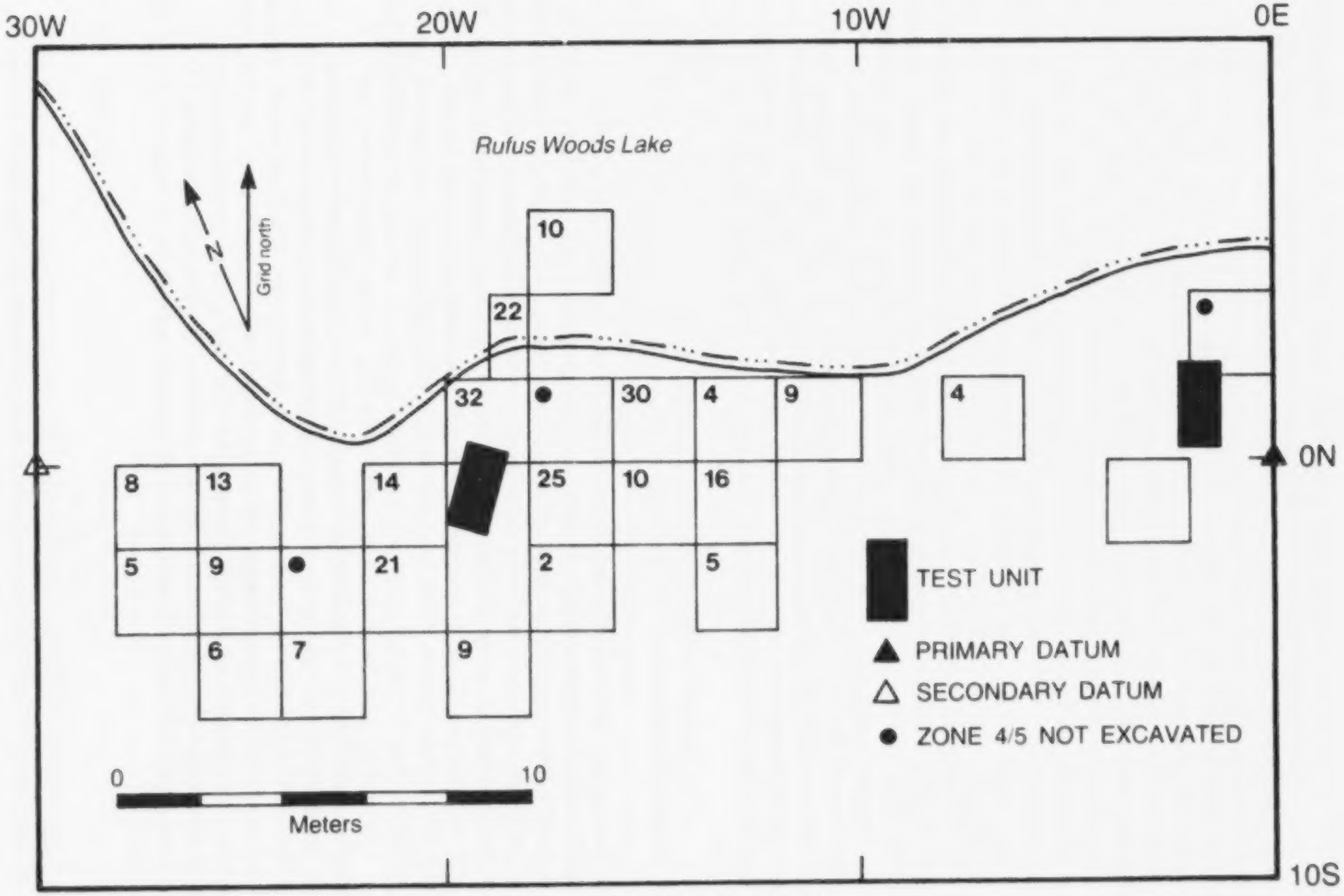

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
10
22
32
●
30
4
9
4
●
8
13
14
25
10
16
5
9
●
21
2
5
6
7
9
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
● ZONE 4/5 NOT EXCAVATED
0
10
Meters

Figure 6-1. Distribution of all lithics, Zone 4/5, 45-DO-273.

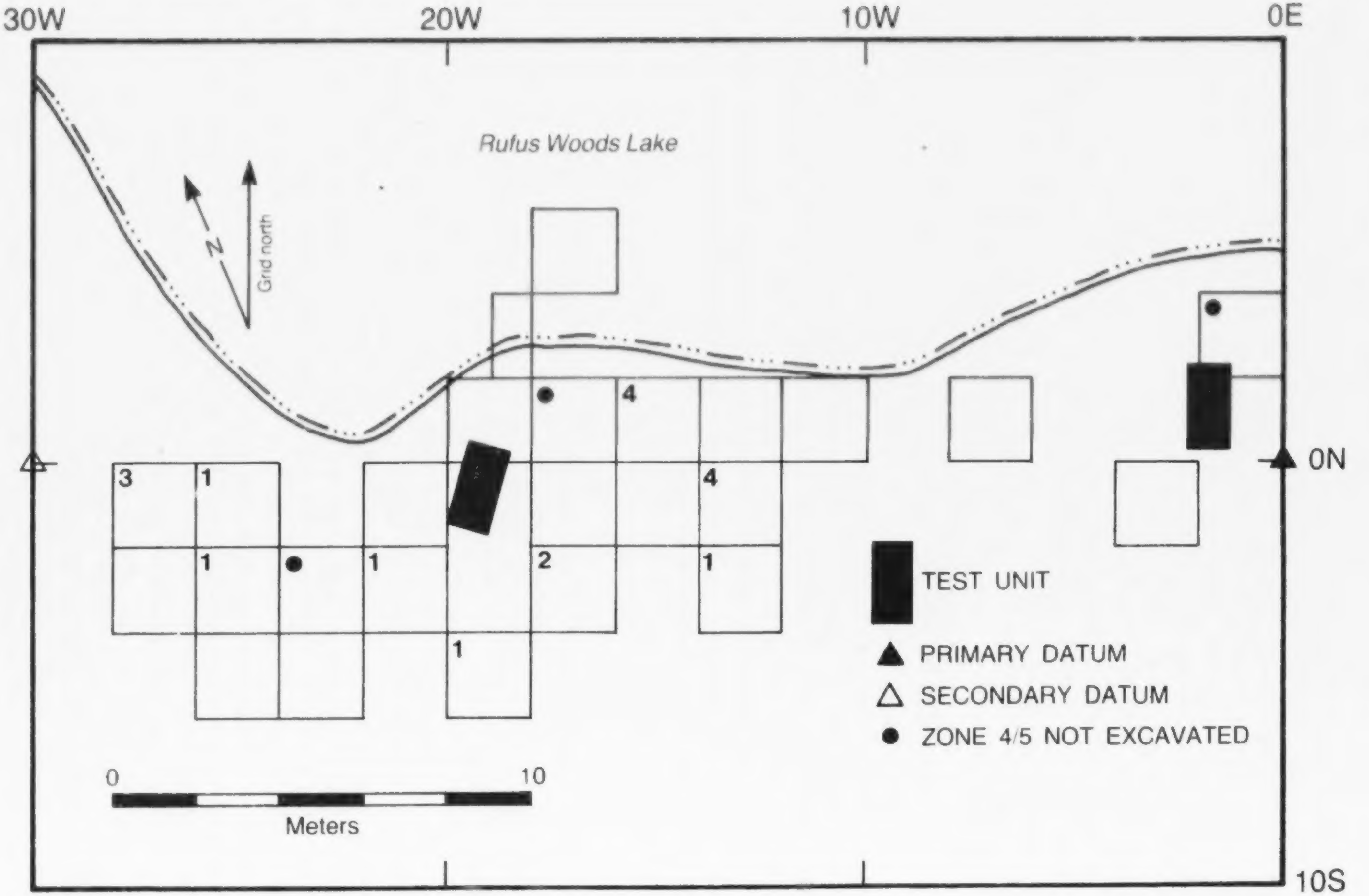

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
3
1
1
1
1
1
2
4
4
1
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
● ZONE 4/5 NOT EXCAVATED
0
10
Meters

Figure 6-2. Distribution of bone in Zone 4/5, 45-DO-273.

included this zone. Bone, shown in Figure 6-2, occurs too infrequently to show food processing areas. Figure 6-3, presenting distributions of shell and FMR, is of interest because the eight FMR from unit 4S14W suggest that excavations were terminated just west of an area that may contain more of these artifacts, indicating that fire may have been used at the site in this zone.

Formed and modified objects, shown in Figure 6-4, tend to cluster in the northern site area, immediately south of the present beach. Projectile points tend to occur in the east-central part of the site, but their low numbers preclude interpretation of distributional data. The relatively large number of bifaces indicates that here occurred the cutting and scraping of medium-hard objects such as wood. The ratio of implements to debitage is higher in this zone than in the others, and this may mean that lithic manufacture was not as important here as it was in the upper zones. During this occupation, tool kits may have been repaired or implements of wood manufactured.

Microblades and tabular knifes, shown in Figure 6-5, occur in low numbers; however, microblades tend to be restricted to the central and western site areas. Although this distribution differs somewhat from that of other artifact types, we can draw no certain inference.

The picture presented by this artifact distribution is one of a short-term camp. While no charcoal was recovered, the fire-modified rocks suggest there may have been a fireplace just east of them.

ZONE 3

For Zone 3, which has a larger artifact assemblage than Zone 4/5, it is possible to define activity areas based on the distributions of lithics, bone, FMR, formed and worn/manufactured lithics, microblades, and tabular knives (Figure 6-6 through 6-10).

Lithic counts are high in the southern part of the site, with the greatest number occurring in unit 4S24W (Figure 6-6). Implements of various kinds, shown in Figure 6-9, tend to occur in larger numbers in the areas of high and intermediate lithic concentration. These artifacts may well have been manufactured in these areas. The numbers of microblades correlate well with the numbers of total lithics. All units with more than 150 lithics yielded at least five microblades, and only one unit (4S26W) with more than five microblades included fewer than 150 lithics. These distributions show that microblades were also manufactured in those units. A high concentration of bone is located immediately to the northwest of the lithic concentration (Figure 6-7) and a concentration of FMR lies just east of the bone concentration and north of the lithic concentration (Figure 6-8). The very large number of FMR in unit 0S14W is unusual at this site.

Based on the above information we define a primary lithic manufacturing area (Area 1. Figure 6-16). The ratio of all lithics to tools averages approximately 55:1, with a range of 99:0 to 32:1 and a median of 65:1 (compare Figure 6-6 and 6-9). A secondary lithic tool manufacturing area is located in the area of the present beach (Area 2, Figure 6-16). Here the ratio of lithics to formed and worn/manufactured objects is 14:1. For all other units

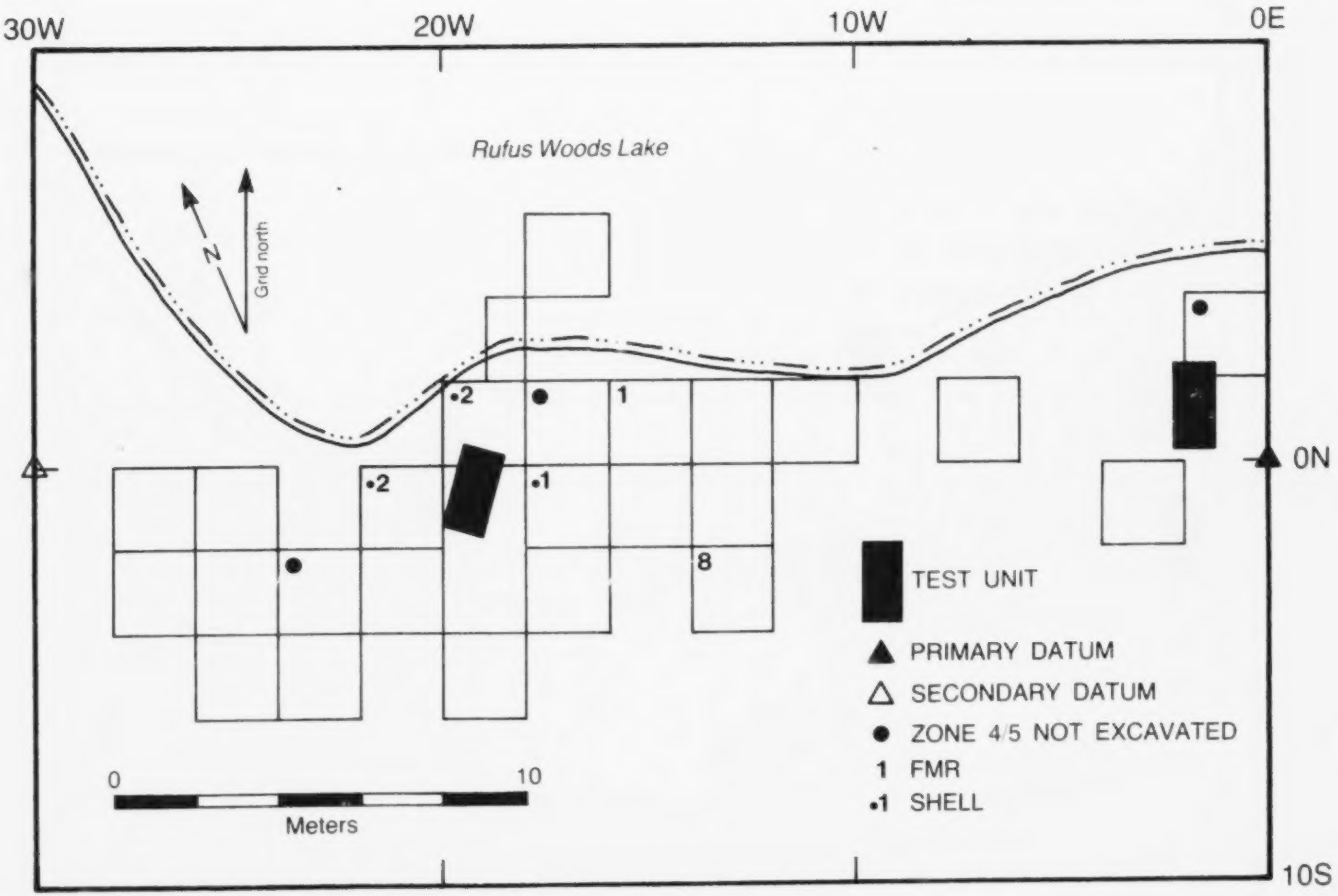

30W
20W
10W
0E
Rufus Woods Lake
N
Grid north
0N
10S
•2
•2
•1
1
8
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
ZONE 4/5 NOT EXCAVATED
1 FMR
•1 SHELL
0
10
Meters

Figure 6-3. Distribution of FMR and shell, Zone 4/5, 45-DO-273.

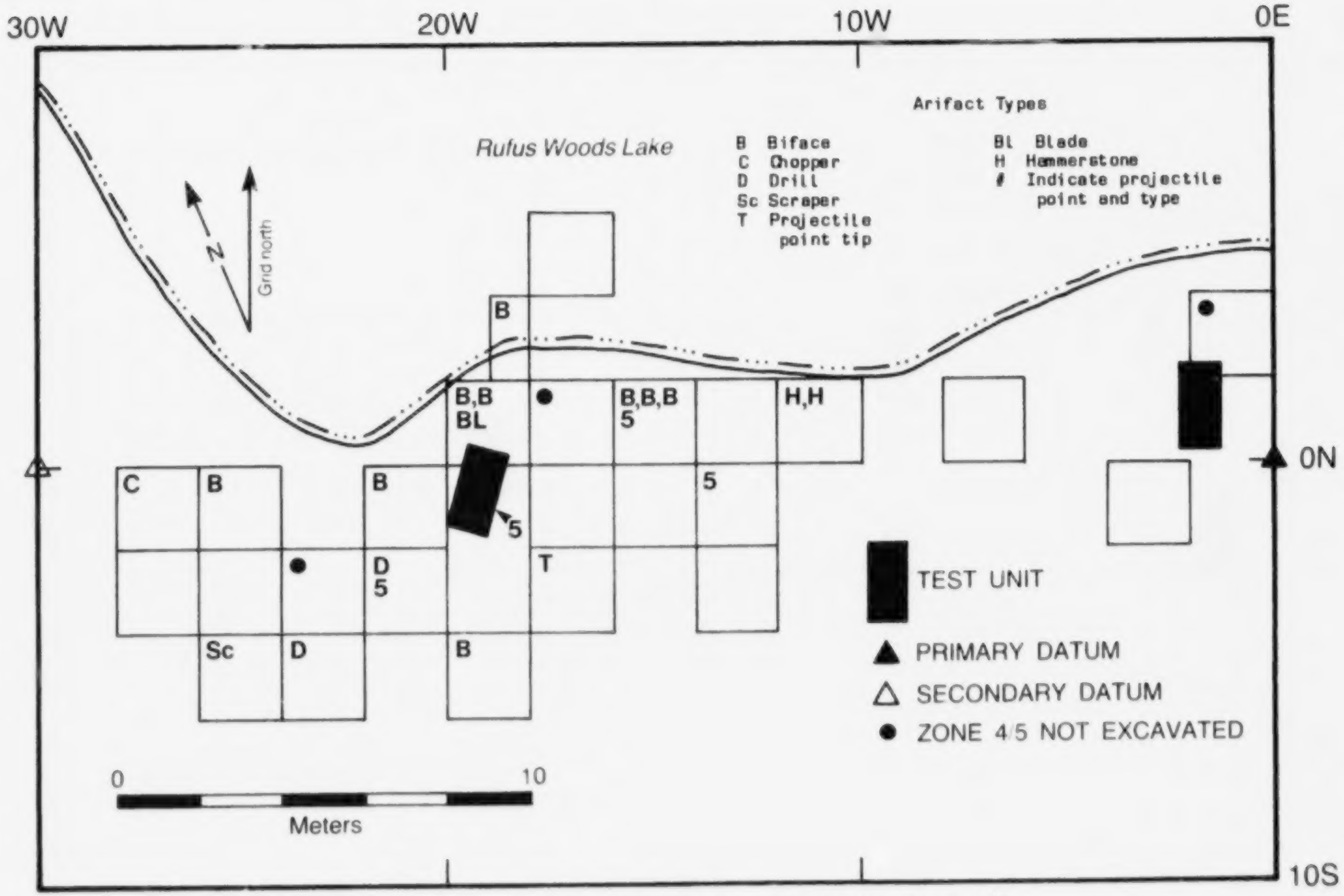

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
Grid north
N
Arifact Types
B Biface
C Chopper
D Drill
Sc Scraper
T Projectile point tip
Bl Blade
H Hammerstone
# Indicate projectile point and type
C
B
Sc
D
B
D
5
B,B
BL
5
B
T
B
B,B,B
5
5
H,H
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
● ZONE 4/5 NOT EXCAVATED
0
10
Meters

Figure 6-4. Distribution of formed and worn/manufactured objects, Zone 4/5, 45-DO-273.

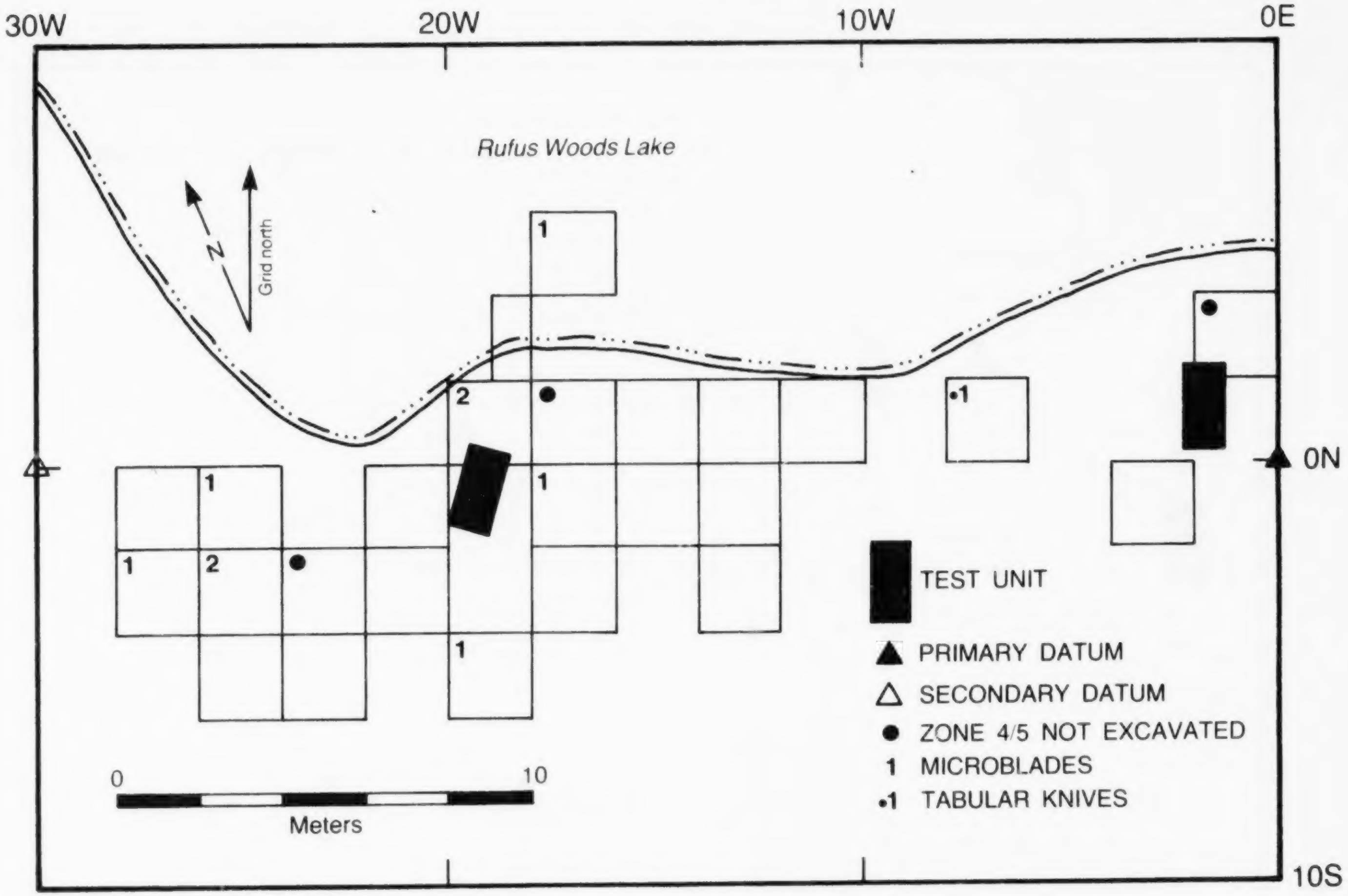

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
ZONE 4/5 NOT EXCAVATED
1 MICROBLADES
•1 TABULAR KNIVES
0
10
Meters
1
1
2
1
1
2
1
1
•1

Figure 6-5. Distribution of microblade industry and tabular knives, Zone 4/5, 45-DO-273.

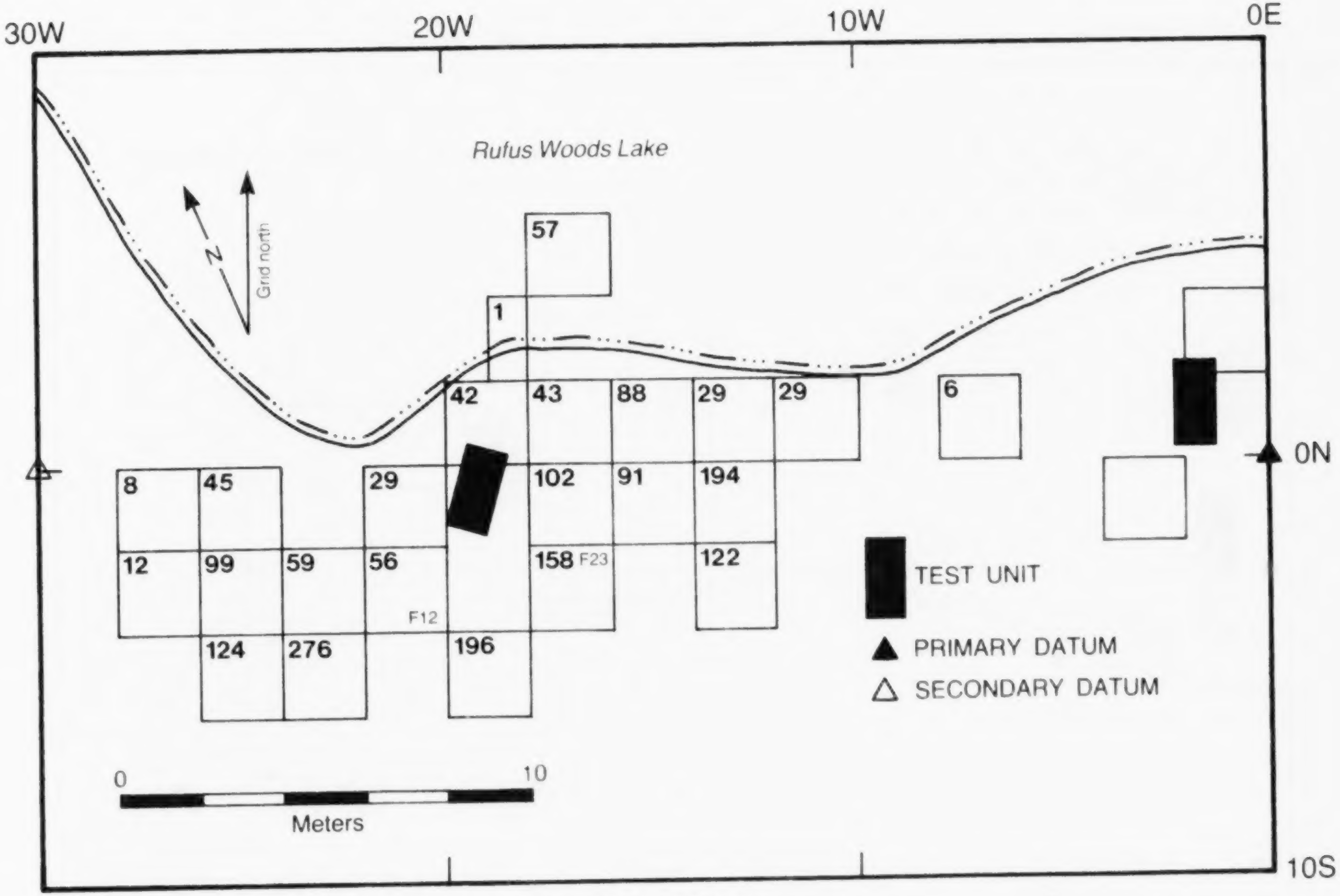

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
57
1
42
43
88
29
29
6
8
45
29
102
91
194
12
99
59
56
158
F23
122
F12
124
276
196
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
0
10
Meters

Figure 6-6. Distribution of lithics, Zone 3, 45-DO-273.

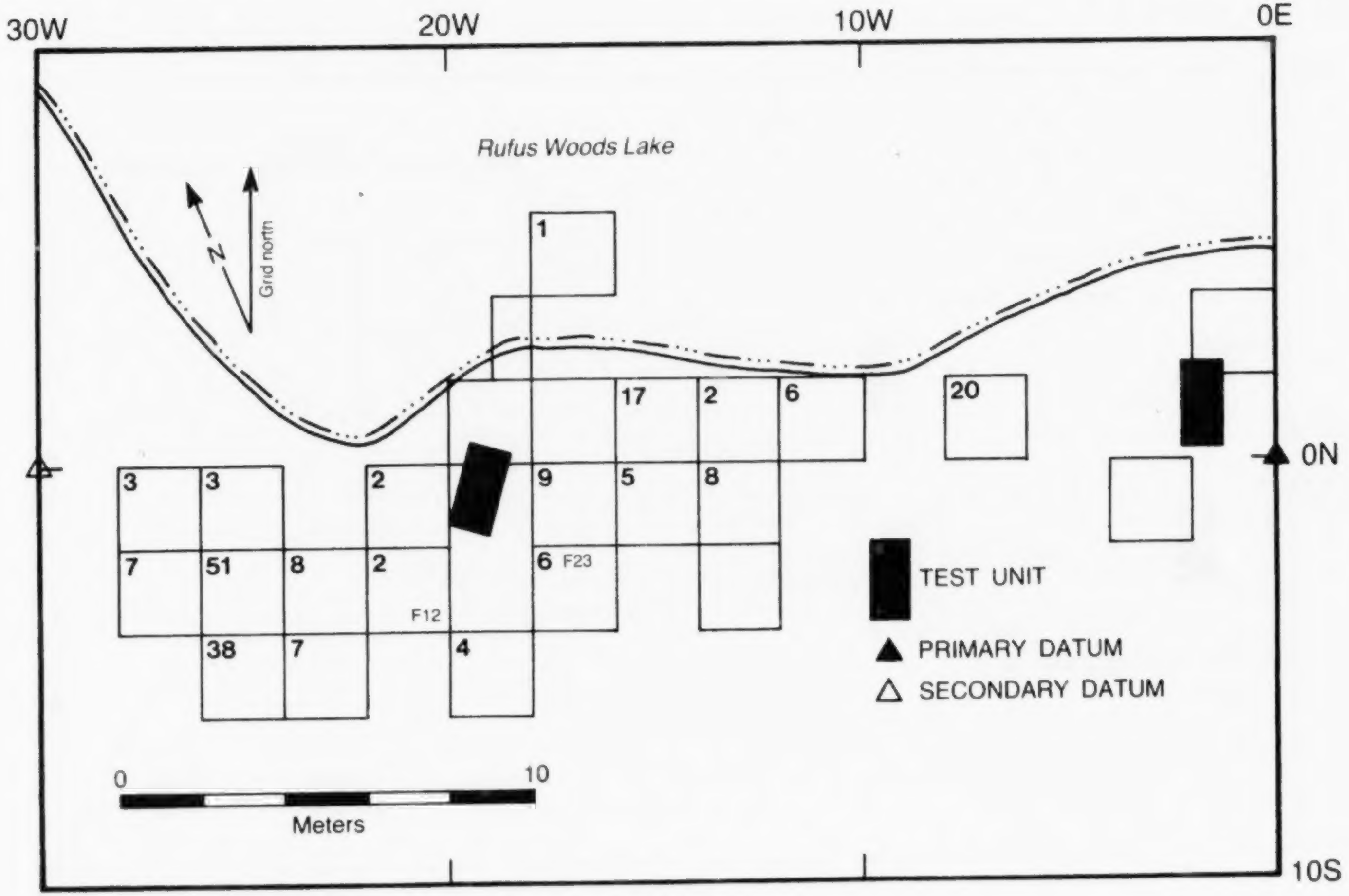

30W
20W
10W
0E
Rufus Woods Lake
N
Grid north
1
17
2
6
20
0N
3
3
2
9
5
8
7
51
8
2
6
F23
F12
38
7
4
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
0
10
Meters
10S

Figure 6-7. Distribution of bone, Zone 3, 45-DO-273.

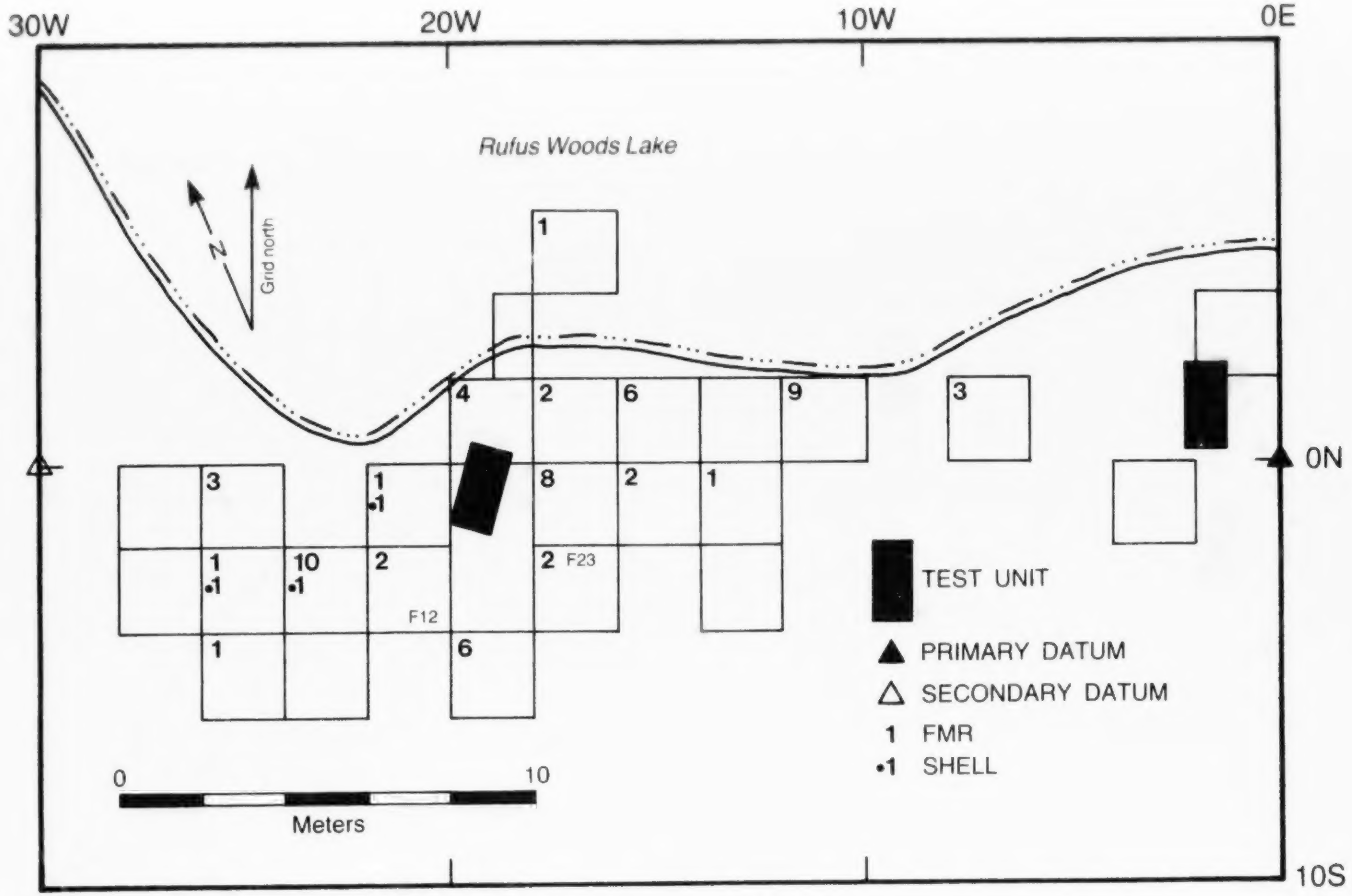

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
1
4
2
6
9
3
3
1
•1
8
2
1
1
•1
10
•1
2
2
F23
F12
1
6
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
1 FMR
•1 SHELL
0
10
Meters

Figure 6-8. Distribution of FMR and shell, Zone 3, 45-DO-273.

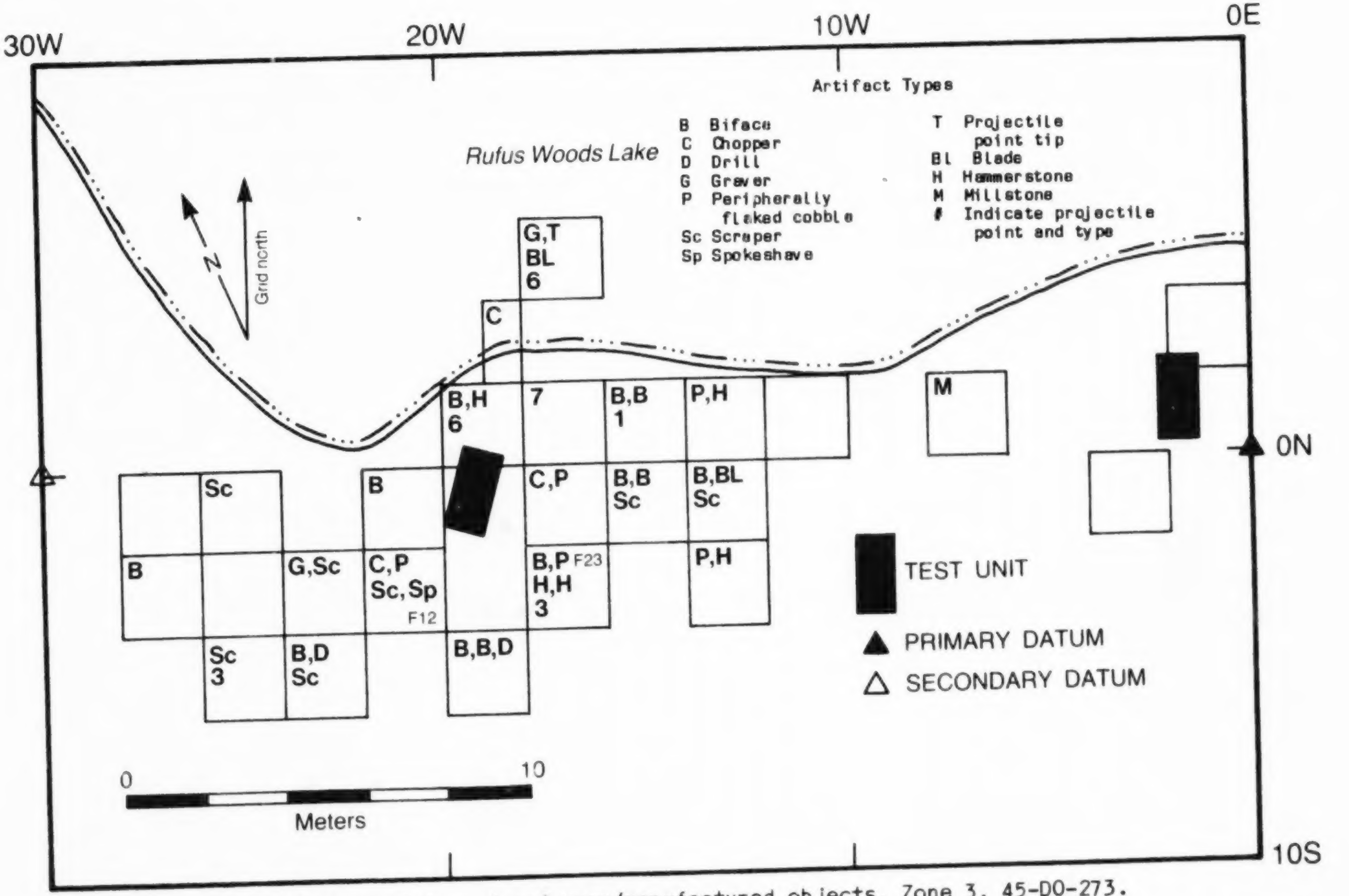

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
Grid north
N
Artifact Types
B Biface
C Chopper
D Drill
G Graver
P Peripherally flaked cobble
Sc Scraper
Sp Spokeshave
T Projectile point tip
Bl Blade
H Hammerstone
M Millstone
# Indicate projectile point and type
G,T BL 6
C
B,H 6
7
B,B 1
P,H
M
Sc
B
C,P
B,B Sc
B,BL Sc
B
G,Sc
C,P Sc,Sp F12
B,P F23 H,H 3
P,H
Sc 3
B,D Sc
B,B,D
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
0
10
Meters

Figure 6-9. Distribution of formed and worn/manufactured objects, Zone 3, 45-DO-273.

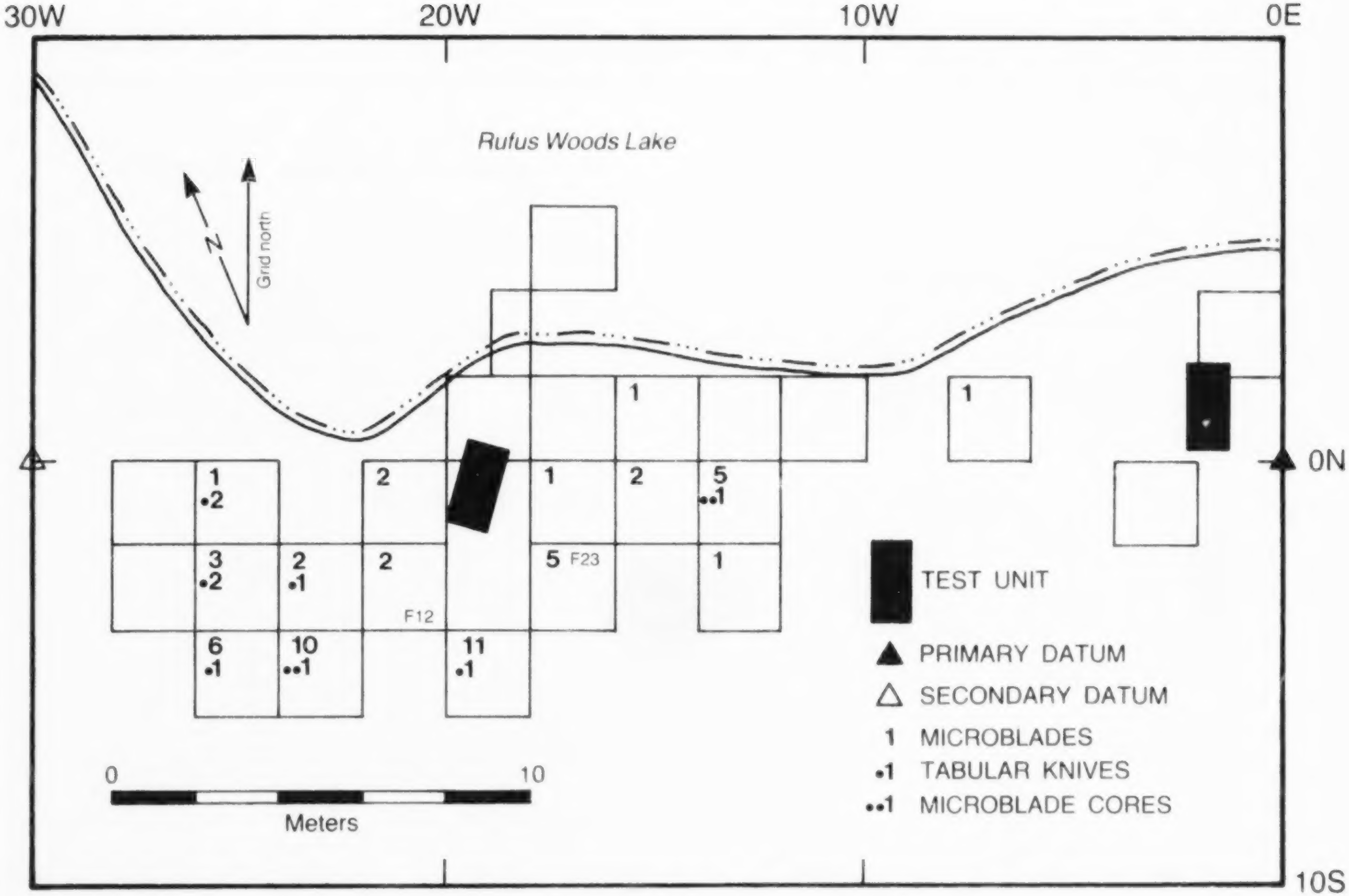

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
1
•2
3
•2
6
•1
2
•1
10
••1
2
2
F12
11
•1
1
5 F23
1
2
5
••1
1
1
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
1 MICROBLADES
•1 TABULAR KNIVES
••1 MICROBLADE CORES
0
10
Meters

Figure 6-10. Distribution of microblade industry and tabular knives, Zone 3, 45-DO-273.

between areas 1 and 2, this ratio averages 30:1, ranging from 45:1 to 6:1 with a median of 29:1. High frequencies of FMR indicate where stones were heated (Area 3, Figure 6-16). Area 4 (Figure 6-16) is distinguished by large numbers of both FMR and bone: here food was prepared and consumed. A few pieces of shell were recovered nearby, indicating that freshwater shellfish formed a small part of the diet. As the distribution of microblades does not correspond to that of bone, we infer that they were not used to cut meat at the site, but were manufactured for use elsewhere.

In summary, we suggest that primary reduction of lithics took place in Area 1 and that tools were shaped and maintained in Area 2. In the southern part of the site, adjoining concentrations of bone, FMR, and lithics indicate a large outdoor occupation surface where artifacts were manufactured, food prepared and eaten, and fires laid. The absence of charcoal in Zone 3 is probably due to deflation. However, deflation has not affected the distribution of other, heavier types of artifacts.

ZONE 2

Distributions of lithics in Zone 2 are shown in Figure 6-11. Two concentrations are present, one in the north-central and one in the south-central site area. Because the area between these concentrations was not excavated, they may represent one single larger concentration. The bone distribution, presented in Figure 6-12, shows a general scattering, though greater numbers of bones are present in units near the lithic concentrations. Clusters of FMR, shown in Figure 6-13, occur in the north-central site area and two meters east of there. Relatively large numbers of implements, shown in Figure 6-14, also occur in areas with clusters of lithics. The unit with the mot lithics--over 150--included only one implement. On the other hand, this unit yielded the largest number of microblades in the zone, (Figure 6-15). Tabular knives, also shown in this figure, are restricted to the northeast part of the block excavation.

SUMMARY

Site 45-DO-273 was occupied at wide intervals during a 5,500 year span from approximately 6500 to 1000 years ago. The presence of three zones of cultural materials separated by several thousand years indicates that visits to the site occurred more or less at random.

Zone 4/5 apparently includes one or more small, generalized camps left behind by a small group of people that stayed at the site for a short period. Since this zone was recovered from two distinct depositional units, people may have camped at the site twice. These people manufactured lithics and worked other materials. They probably hunted small game near the site and then prepared and ate the animals--squirrels and marmots--there. Also they manufactured, repaired, and perhaps used leaf-shaped projectile points for hunting.

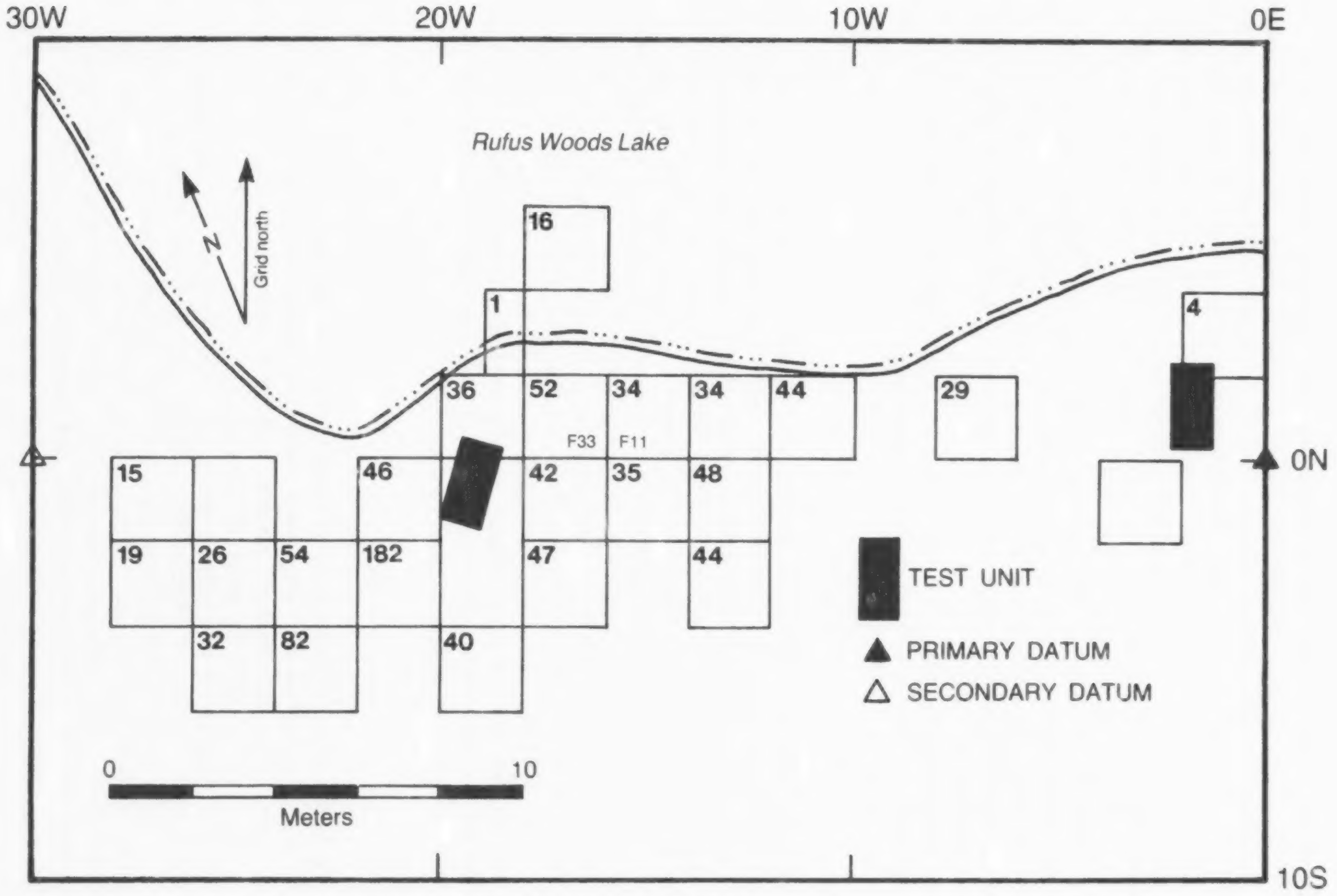

30W
20W
10W
0E
Rufus Woods Lake
N
Grid north
16
1
4
36
52
34
34
44
29
F33
F11
0N
15
46
42
35
48
19
26
54
182
47
44
32
82
40
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
0
10
Meters
10S

Figure 6-11. Distribution of lithics, Zone 2, 45-DO-273.

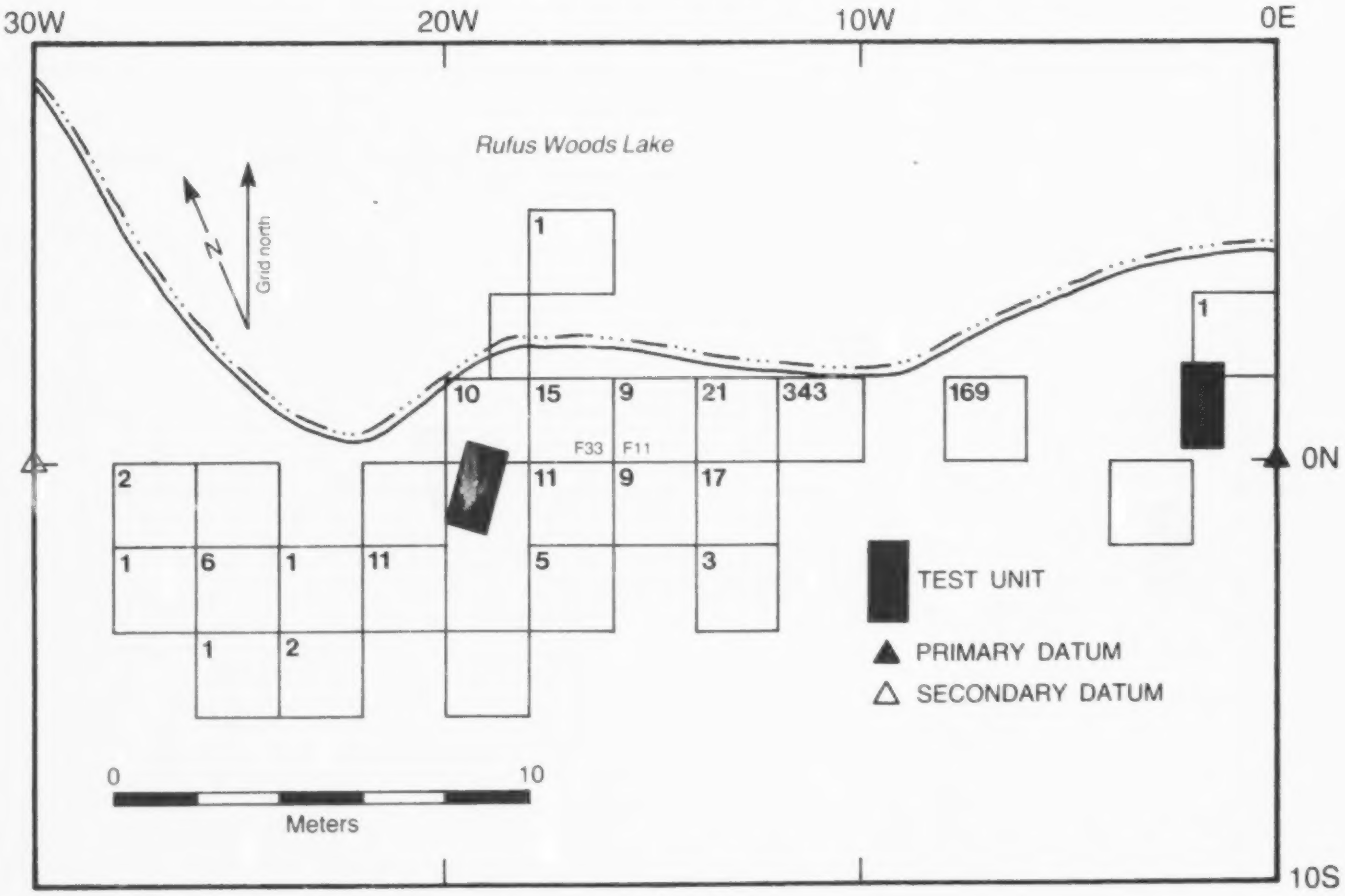

30W
20W
10W
0E
Rufus Woods Lake
N
Grid north
1
1
10
15
9
21
343
169
F33
F11
2
11
9
17
0N
1
6
1
11
5
3
1
2
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
0
10
Meters
10S

Figure 6-12. Distribution of bone, Zone 2, 45-DO-273.

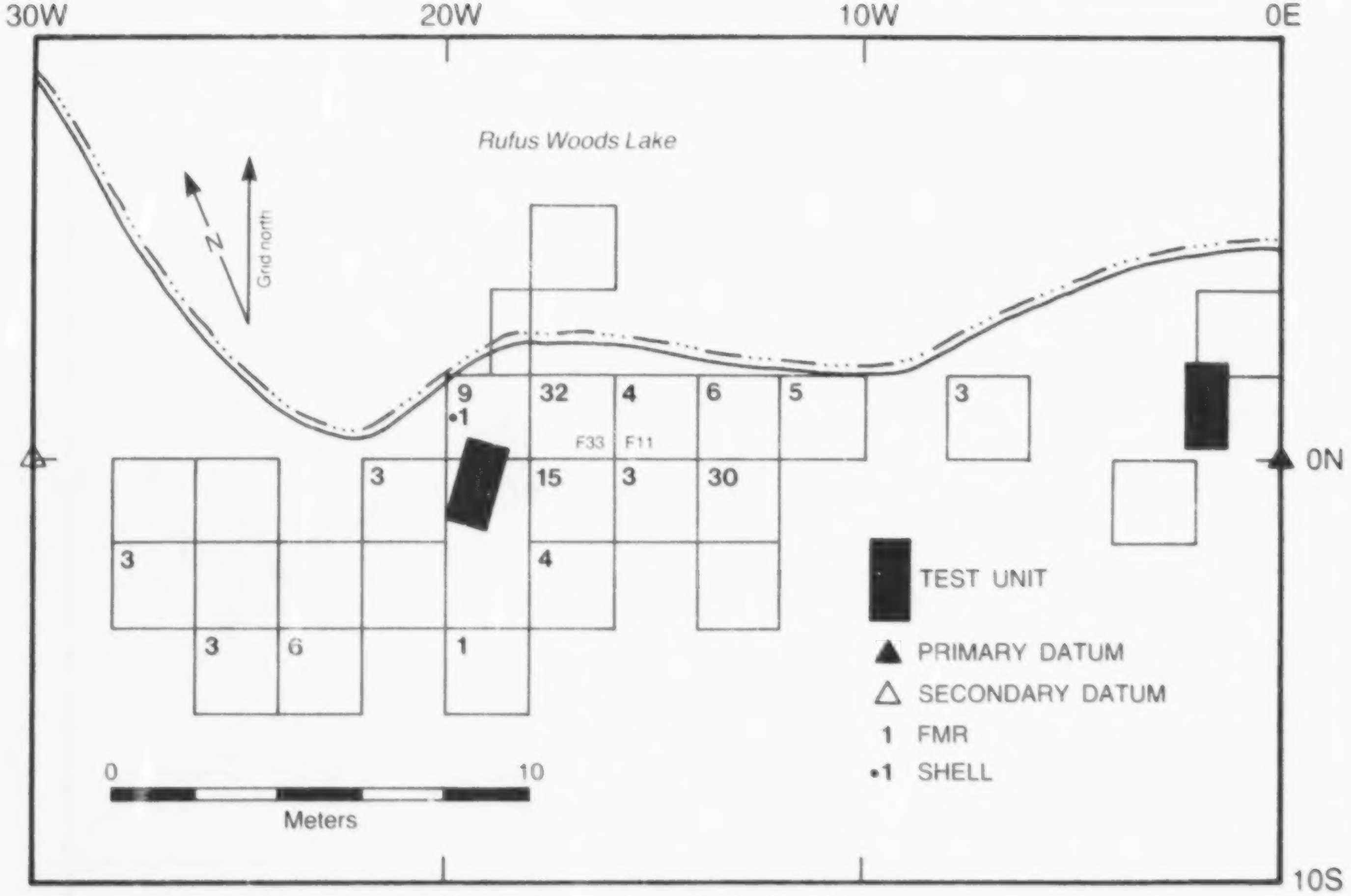

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
9
•1
32
4
6
5
3
F33
F11
3
15
3
30
3
4
3
6
1
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
1 FMR
•1 SHELL
0
10
Meters

Figure 6-13. Distribution of FMR and shell, Zone 2, 45-DO-273.

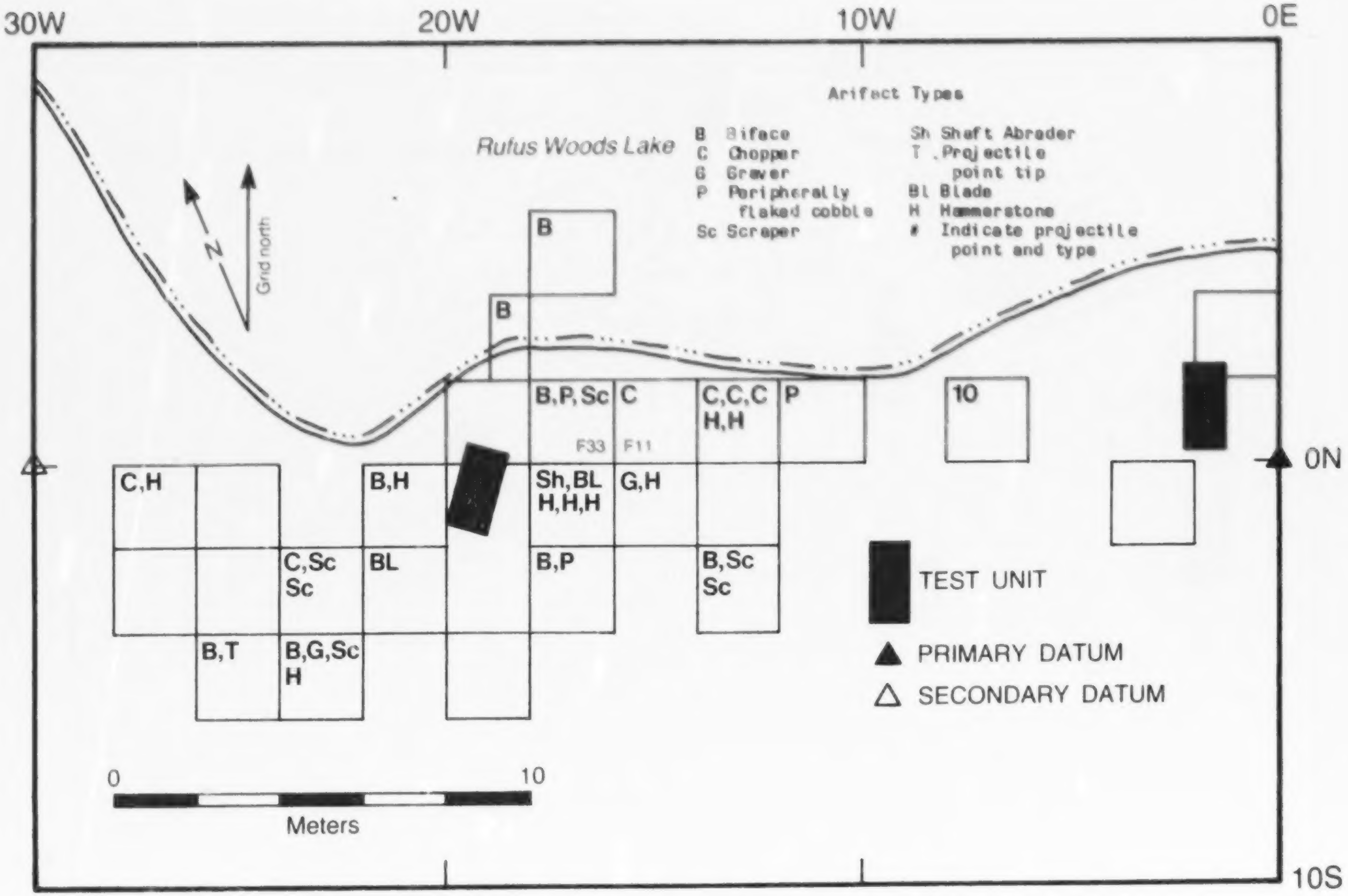

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
Grid north
N
Arifact Types
B Biface
C Chopper
G Graver
P Peripherally flaked cobble
Sc Scraper
Sh Shaft Abrader
T Projectile point tip
Bl Blade
H Hammerstone
# Indicate projectile point and type
B
B
B,P,Sc
C
C,C,C H,H
P
10
F33
F11
C,H
B,H
Sh,BL H,H,H
G,H
C,Sc Sc
BL
B,P
B,Sc Sc
B,T
B,G,Sc H
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
0
10
Meters

Figure 6-14. Distribution of formed and worn/manufactured objects, Zone 2, 45-DO-273.

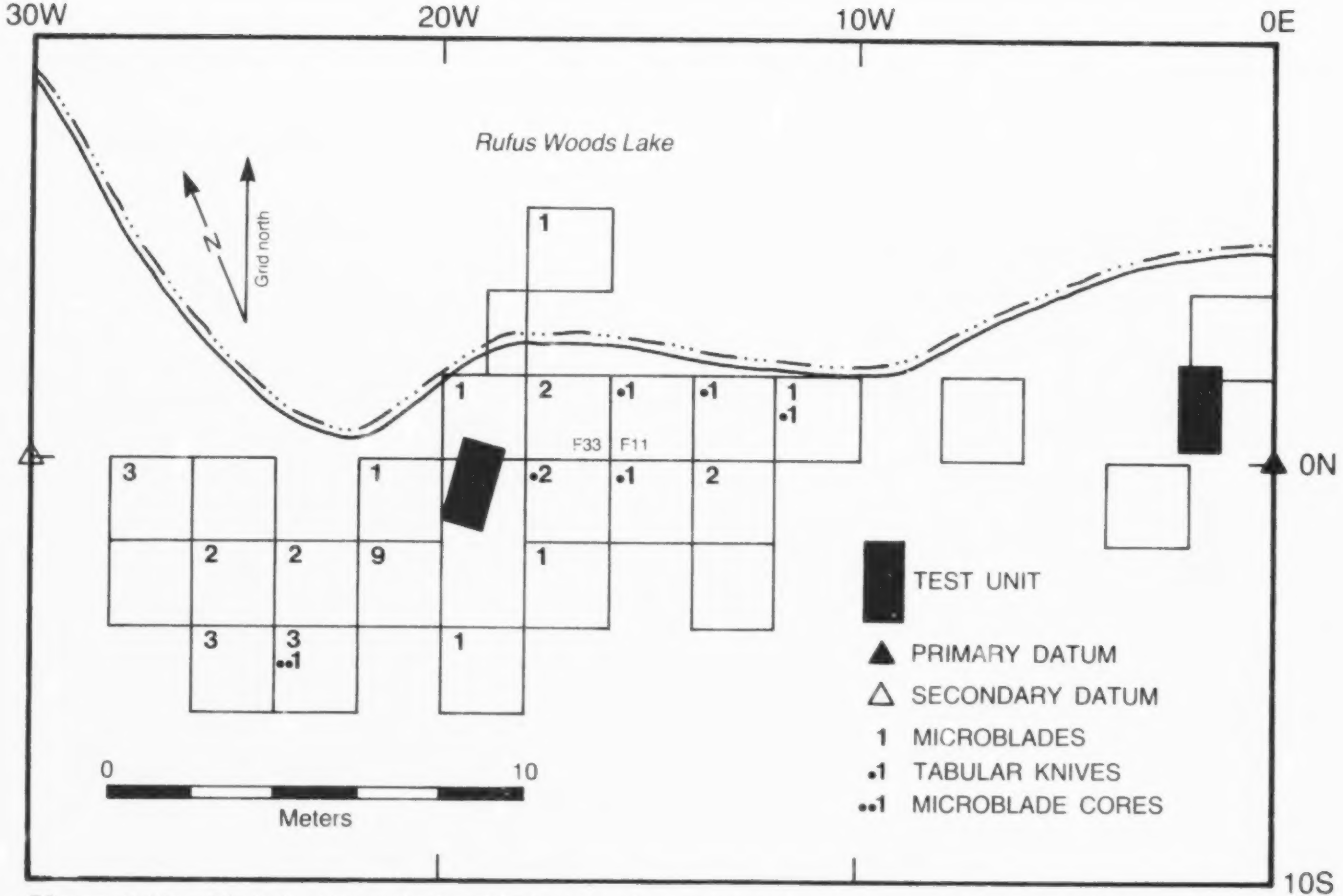

30W
20W
10W
0E
Rufus Woods Lake
N
Grid north
0N
10S
F33
F11
3
2
2
9
1
1
3
3
••1
1
1
2
•2
1
•1
•1
2
•1
1
•1
TEST UNIT
PRIMARY DATUM
SECONDARY DATUM
1 MICROBLADES
•1 TABULAR KNIVES
••1 MICROBLADE CORES
0
10
Meters

Figure 6-15. Distribution of microblade industry and tabular knives, Zone 2, 45-DO-273.

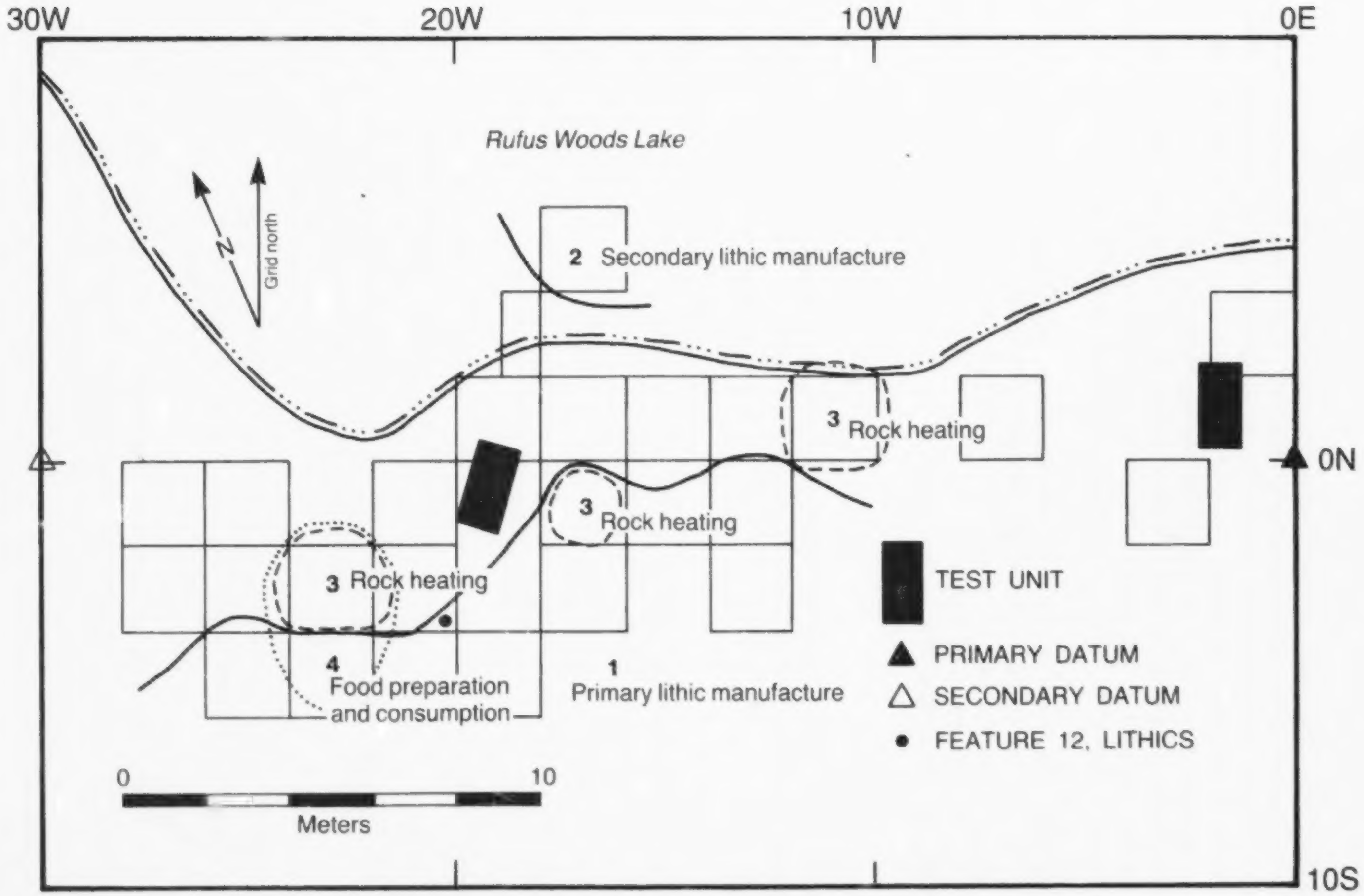

30W
20W
10W
0E
0N
10S
Rufus Woods Lake
N
Grid north
2 Secondary lithic manufacture
3 Rock heating
3 Rock heating
3 Rock heating
4 Food preparation and consumption
1 Primary lithic manufacture
TEST UNIT
▲ PRIMARY DATUM
△ SECONDARY DATUM
● FEATURE 12, LITHICS
0
10
Meters

Figure 6-16. Activity areas in Zone 3, 45-DO-273.

Zone 3 has the only well-defined activity area. There lithics--and, by inference, other materials--were manufactued. Again, small game of the marmot and rodent kind were probably hunted locally and shellfish gathered. The quantities of lithics recovered indicate the occupation of a larger group. Several occupations may have occurred during this period.

The cultural deposits from Zone 2 leads us to infer the occupation of a small group of people for one or two very short intervals. The activities of these people resemble those of previous periods except they probably hunted deer and elk.

Perhaps the most remarkable aspect of our findings is the scanty change evident in the artifact assemblage throughout the 5500 years of sporadic occupation. Tenative as our reading of the data must remain, we may partly attribute this to the constancy of the site function: similar artifacts were used for the same tasks.

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APPENDIX A:

RADIOCARBON DATE SAMPLES
AND
RESULTS OF SOIL ANALYSES, 45-DO-273

Table A-1. Radiocarbon date samples, 45-DO-273.

Lab Sample #[1]	Zone	OU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years B.P.) T1/2=5730	Dendrocorrected Age[2] (Years B.P.)
TX-4170	4	II	180	1N18W	100	31	Decomposing wood/7.8	1050±180	1038±163
	F31 is supposedly a rodent run. But wood is said to be redeposited, "located in buried stream channel.								
TX-4171	4	II	180	2N18W	100	31	Decomposing wood/11.5	990±380	988±381

[1] TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
[2] Dendrocorrected according to Damon et al. (1974).

Table A-2. Results of chemical and physical soil analyses, 45-DO-273.

Field Stratum	DU	Sample No.	cm Below Surface	Physical Analyses									Chemical Analyses			
				Munsell Color (dry)	Particle Size	Constituents							pH	Organic Matter (%)	Exchangeable Calcium (ppm)	Phosphate (ppm)
					Sand/Silt/Clay (%)	Charcoal (%)	Mazama Tephra[1] (%)	Bone (%)	Shell (%)	Organic Matter (%)	Minerals (%)	Grain Rounding[1]				
IV	3a	1	60- 70	10YR(7/3)	82/18/0	Trace	Trace	2	Trace	Trace	95	1-2	7.1	-	140	80.2
		2	70- 74	10YR(7/3)	80/17/0	Trace	Trace	-	1	1	96	1-4	7.1	-	-	83.7
V	2	3	74- 80	10YR(7/3)	82/18/0	-	-	-	1	-	99	1-4	7.2	-	-	63.0
		4	80- 90	10YR(7/3)	95/5/0	Trace	-	Trace	Trace	Trace	97	1-4	7.0	-	-	64.4
		5	90-100	10YR(7/2)	82/15/3	Trace	-	Trace	Trace	-	98	1-4	7.2	-	-	64.4
		6	102-110	10YR(7/3)	95/2/3	Trace	Trace	Trace	Trace	-	98	1-2	7.1	-	-	48.2
VIa		7	112-118	10YR(8/2)	90/10/0	-	Trace	-	Trace	-	98	1-2	7.7	-	1400	25.9
VII		8	114-120	5YR(8/1)	35/57/8	-	25	-	Trace	-	74	1-4	7.9	-	3045	51.1
		9	120-126	5YR(8/1)	30/65/5	-	70	-	Trace	Trace	29	2	7.9	-	1120	32.2
		10	126-130	5YR(8/1)	27/65/8	-	50	-	-	-	50	1-4	7.7	-	2970	35.7
		11	130-137	5YR(8/1)	22/65/13	-	60	-	-	-	40	1-4	7.8	-	2875	24.5
VIIa		12	137-143	5YR(8/1)	37/58/5	-	25	-	-	-	75	1-2	7.8	-	1575	18.9
VIII	1	13	143-150	10YR(7/2)	92/5/3	-	Trace	-	Trace	-	99	1-4	7.6	-	378	36.4
IX		14	150-160	10YR(7/3)	90/7/3	-	Trace	-	Trace	-	98	1-4	7.8	-	1400	56.0
		15	162-168	10YR(7/2)	85/15/0	-	-	-	Trace	-	99	1-4	7.6	-	910	37.1
X		16	168-175	10YR(7/3)	55/42/3	-	-	-	Trace	-	85	2-4	7.4	-	3150	32.9
XI		17	175-180	10YR(7/2)	77/20/3	-	-	-	Trace	-	99	2-4	7.6	-	3157	23.1
		18	181-190	10YR(7/2)	80/20/0	-	-	-	Trace	-	99	2-4	7.5	-	182	28.7
		19	181-190	10YR(7/2)	95/5/0	-	-	-	Trace	-	99	2-4	7.4	-	140	38.9
XIa		20	190-200	10YR(7/2)	85/15/0	-	-	-	Trace	-	99	2-3	7.3	-	182	38.5
		21	200-210	10YR(7/2)	80/17/3	-	-	-	Trace	-	99	2-3	7.4	-	980	37.1
XIII		22	210-220	10YR(7/2)	75/22/3	-	-	-	Trace	-	96	1-4	7.6	-	1960	30.1
		23	210-108	10YR(7/2)	62/35/3	-	-	-	Trace	-	84	1-4	7.5	-	958	30.1
		24	220-230	10YR(7/2)	57/40/3	-	-	-	Trace	-	86	1-4	7.5	-	378	58.8

[1] 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-DO-273

Table B-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Opal
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Silicized mudstone
- Argillite
- Granite
- Siltstone/mudstone
- Schist
- Graphite/molybdenite
- Bone/antler
- Ochre
- Shell
- Dentalium

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated (heat treatment)

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from the site are listed here; a complete list is available in the Project's Research Design (Campbell 1984d).

Table B-2. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

None
Wear only
Manufacture only
Manufacture and wear
Modified/indeterminate
Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

None
Chipping
Pecking
Grinding
Chipping and pecking
Chipping and grinding
Pecking and grinding
Chipping, pecking, grinding
Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

None
Partial
Total
Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

None
Complete
Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

None
Independent
Overlapping - total
Overlapping - partial
Independent - opposite
Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

Abrasion/grinding
Smoothing
Crushing/pecking
Polishing

DIMENSION VI: Continued

Feathered chipping
Feathered chipping/abrasion
Feathered chipping/smoothing
Feathered chipping/crushing
Feathered chipping/polishing
Hinged chipping
Hinged chipping/abrasion
Hinged chipping/smoothing
Hinged chipping/crushing
Hinged chipping/polishing
None

DIMENSION VII: LOCATION OF WEAR

Edge only
Unifacial edge
Bifacial edge
Point only
Point and unifacial edge
Point and bifacial edge
Point and any combination
Surface
Terminal surface
None

DIMENSION VIII: SHAPE OF WORN AREA

Not applicable
Convex
Concave
Straight
Point
Notch
Slightly convex
Slightly concave
Irregular

DIMENSION IX: ORIENTATION OF WEAR

Not applicable
Parallel
Oblique
Perpendicular
Diffuse
Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

Actual edge angle

Table B-3. Detailed wear data, DO-273.

Object Type	Kind of Wear	Location of Wear	Grouped Edge Angle	Zone					Total
				1	2	3	4	5	
Microblade	Feathered chipping	Unifacial edge	Medium	2	-	-	-	-	2
			Fine	1	-	2	-	-	3
Utilized flake	Smoothing	Edge only	Fine	-	-	-	1	-	1
			Steep	-	-	1	-	-	1
		Unifacial edge	Medium	-	1	3	-	-	4
		Bifacial edge	Medium	-	-	2	-	-	2
		Point only	Medium	-	-	1	-	-	1
	Feathered chipping	Unifacial edge	Fine	14	30	66	15	3	128
			Medium	13	28	40	9	3	93
			Steep	2	1	8	-	-	11
		Bifacial edge	Fine	2	4	4	1	1	12
			Medium	2	2	2	1	-	7
		Point only	Fine	1	-	-	-	-	1
	Hinged chipping	Edge only	Steep	-	1	-	-	-	1
		Unifacial edge	Fine	2	2	3	-	2	9
			Medium	3	10	12	-	2	27
			Steep	1	2	11	-	-	14
		Bifacial edge	Fine	2	-	1	-	-	3
			Medium	-	-	3	1	-	4
			Steep	-	-	1	-	-	1
	Feathered chipping and smoothing	Unifacial edge	Fine	2	-	1	3	-	6
			Medium	-	-	3	-	-	3
			Steep	-	-	1	-	-	1
		Bifacial edge	Fine	-	-	-	1	-	1
	Hinged chipping and smoothing	Bifacial edge	Steep	-	-	1	-	-	1
	Crushing/ Pecking	Point only	Medium	-	-	1	-	-	1
Unifacially retouched flake	Feathered chipping	Unifacial edge	Medium	1	4	3	-	-	8
			Steep	-	1	2	1	-	4
		Bifacial edge	Medium	-	1	-	-	-	1
	Feathered chipping and smoothing	Unifacial edge	Medium	-	1	-	-	-	1
			Steep	-	1		-	-	1
	Hinged chipping	Unifacial edge	Fine	1	-	-	-	-	1
			Medium	-	1	8	2	-	11
			Steep	-	3	1	-	-	4
		Bifacial edge	Medium	-	1	-	-	-	1
			Steep	-	-	1	-	-	1
Bifacially retouched flake	Hinged chipping	Unifacial edge	Medium	-	-	3	-	-	3
		Bifacial edge	Steep	-	-	1	-	-	1
	Hinged chipping and smoothing	Bifacial edge	Medium	1	-	-	-	-	1
	Feathered chipping	Unifacial edge	Medium	1	-	-	-	-	1
		Bifacial edge	Fine	-	-	-	-	2	2
			Medium	-	-	-	-	1	1

Table B-3. Cont'd.

Object type	Kind of Wear	Location of Wear	Grouped Edge Angle	Zone					Total
				1	2	3	4	5	
Resharpening flake	Feathered chipping	Unifacial edge	Fine	-	1	-	-	-	1
			Medium	-	-	1	-	-	1
			Steep	-	-	1	-	-	1
	Hinged chipping	Unifacial edge	Fine	-	-	1	-	-	1
			Medium	-	-	2	-	-	2
			Steep	-	1	-	-	-	1
Core	Feathered chipping	Unifacial edge	Medium	-	-	1	-	-	1
	Hinged chipping	Unifacial edge	Steep	-	1	-	-	-	1
Chopper	Crushing/ Pecking	Bifacial edge	Medium	1	-	-	-	-	1
	Feathered chipping and smoothing	Unifacial edge	Steep	-	-	1	-	-	1
	Hinged chipping and crushing	Bifacial edge	Medium	-	1	-	-	-	1
	Hinged chipping and smoothing	Bifacial edge	Steep	-	5	-	-	-	5
Hammerstone	Crushing/ Pecking	Terminal surface	Very steep	3	16	8	-	4	31
	Smoothing	Terminal surface	Very steep	-	1	-	-	-	1
Peripherally flaked cobble	Crushing/ Pecking	Edge only	Steep	-	2	1	-	-	3
		Bifacial edge	Medium	-	-	2	-	-	2
			Steep	-	-	1	-	-	1
	Smoothing	Edge only	Steep	-	-	2	-	-	2
Biface	Feathered chipping	Unifacial edge	Medium	-	1	2	1	-	4
			Steep	-	1	-	-	-	1
		Bifacial edge	Medium	-	-	1	-	1	2
			Steep	-	-	-	-	1	1
	Smoothing	Bifacial edge	Fine	-	-	1	-	-	1
	Feathered chipping and smoothing	Unifacial edge	Medium	-	-	2	-	-	2
		Bifacial edge	Steep	-	1	-	-	-	1
	Hinged chipping	Unifacial edge	Medium	-	1	-	-	-	1
			Steep	-	1	1	-	-	2
		Bifacial edge	Medium	1	-	1	-	-	2
			Steep	-	1	-	-	-	1
	Hinged chipping and smoothing	Unifacial edge	Medium	-	2	-	-	-	2
			Steep	-	-	-	1	-	1
		Bifacial edge	Medium	-	-	1	-	-	1
			Steep	-	1	-	-	-	1

Table B-3. Cont'd.

Object type	Kind of Wear	Location of Wear	Grouped Edge Angle	Zone					Total
				1	2	3	4	5	
Projectile point	Feathered chipping	Unifacial edge	Medium	-	-	4	-	-	4
	Feathered chipping and smoothing	Point and unifacial edge or both	Medium	-	-	1	-	-	1
	Hinged chipping	Unifacial edge	Medium	-	1	-	-	-	1
			Steep	-	1	1	-	-	2
	Smoothing	Bifacial edge	Medium	-	1	2	-	-	3
Projectile point base	Feathered chipping	Unifacial edge	Medium	-	1	-	-	-	1
Projectile point tip	Feathered chipping	Unifacial edge	Medium	1	-	-	-	-	1
	Hinged chipping	Unifacial edge	Fine	-	3		-	-	3
	Smoothing	Point only	Steep	1	-		-	-	1
	Hinged chipping and smoothing	Bifacial edge	Steep	1	-	-	-	-	1
Drill	Feathered chipping	Unifacial edge	Medium	-	-	-	1	-	1
		Point and unifacial edge or both edges	Fine	-	-	1	-	-	1
	Hinged chipping	Point and unifacial edge or both edges	Indeterminate	-	-	-	1	-	1
		Unifacial edge	Medium	-	-	-	1	-	1
		Point and unifacial	Medium	-	-	-	1	-	1
	Polishing	Point only	Medium	-	-	1	-	-	1
Graver	Feathered chipping and smoothing	Point only	Medium	-	-	1	-	-	1
	Feathered chipping	Point and unifacial or both edges	Medium	-	1	-	-	-	1
	Hinged chipping	Unifacial edge	Steep	-	-	1	-	-	1
		Point and unifacial edge	Medium	-	-	-	1	-	1
			Steep	-	-	1	-	-	1
	Smoothing	Point only	Medium	-	1	-	-	-	1
Tabular knife	Crushing/ pecking	Edge only	Steep	-	2	-	-	-	2
	Smoothing	Edge only	Fine	3	3	1	-	-	7
			Medium	-	1	2	-	1	4
			Steep	-	1	3	-	-	4
		Unifacial edge	Steep	-	-	1	-	-	1
		Terminal surface	Very steep	-	-	1	-	-	1
		Bifacial edge	Medium	-	-	1	-	-	1

Table B-3. Cont'd.

Object type	Kind of Wear	Location of Wear	Grouped Edge Angle	Zone					Total
				1	2	3	4	5	
Scraper	Feathered chipping	Unifacial edge	Fine	-	1	1	-	-	2
			Medium	5	11	4	-	-	20
			Steep	-	-	2	-	-	2
		Bifacial edge	Medium	1	1	-	-	-	2
	Hinged chipping	Unifacial edge	Fine	-	-	1	-	-	1
			Medium	4	3	6	3	-	16
			Steep	2	1	2	-	-	5
		Bifacial edge	Steep	-	-	3	-	-	3
		Point and unifacial edge of both edges	Steep	-	1	-	-	-	1
	Feathered chipping and smoothing	Unifacial edge	Fine	-	-	1	-	-	1
			Medium	-	-	1	-	-	1
	Hinged chipping and smoothing	Unifacial edge	Steep	-	1	-	-	-	1
Spokeshave	Hinged chipping	Unifacial edge	Steep	-	-	1	-	-	1
Indeterminate	Crushing/ pecking	Point only	Indeterterminate	-	-	1	-	-	1
Total				73	163	264	44	21	565

Table B-4. Complete morphological description of projectile points, 45-DO-273.

Master #	Zone	Morphological Type	Morphological Type Description	Historical type Description	Length (mm)	Width (mm)	Thickness (mm)	Material	Complete Morphological Description	Remarks
400	3	1	Large, triangular	-	40.8	22.5	4.3	Jasper	M1N12221NN3	Preform
132	3	3	Large side-notched	Cold Springs Side-notched	45.3[1]	19.7	5.4	Jasper	11313221NN3	Tip reworked
519	3	3	Large side-notched	Cold Springs Side-notched	-	24.2	6.9	Jasper	15N[illegible]1929NN9	Broken above notches
272	4	5	Lanceolate	Cascade A	43.0[1]	14.8	5.4	Chalcedony	N2NN9221194	Base broken
408	5	5	Lanceolate	Cascade A	39.3[1]	18.1	4.8	Jasper	N2NN2321121	Blade reworked
554	4	5	Lanceolate	Cascade C	57.4	15.6	8.7	Jasper	N2NN2222124	-
10	5	5	Lanceolate	Cascade C	41.0	15.4	7.2	Jasper	N2NN2222124	From test excavations
487	1	6	Shouldered, lanceolate	Mahkin Shouldered	33.5[1]	17.0	6.7	Jasper	22NN2221121	Tip broken
578	1	6	Shouldered, lanceolate	Mahkin Shouldered	65.0[1]	22.2	7.3	Basalt	22NN2221124	Tip broken
434	3	6	Shouldered, lanceolate	Mahkin Shouldered	-	21.4	6.9	Jasper	22NN1919129	Blade broken
490	3	6	Shouldered, lanceolate	Mahkin Shouldered	43.2[1]	16.6	5.0	Chalcedony	22NN9221192	Base broken
423	3	7	Large, shouldered triangular contracting stem	Rabbit Island A	31.3	14.1	4.8	Jasper	21212221NN9	-
348	2	10	Small, shouldered triangular, contracting stem	Nespelem Bar	-	13.9	4.7	Jasper	21122929NN1	Blade broken

[1] Actual measurements on broken specimens.

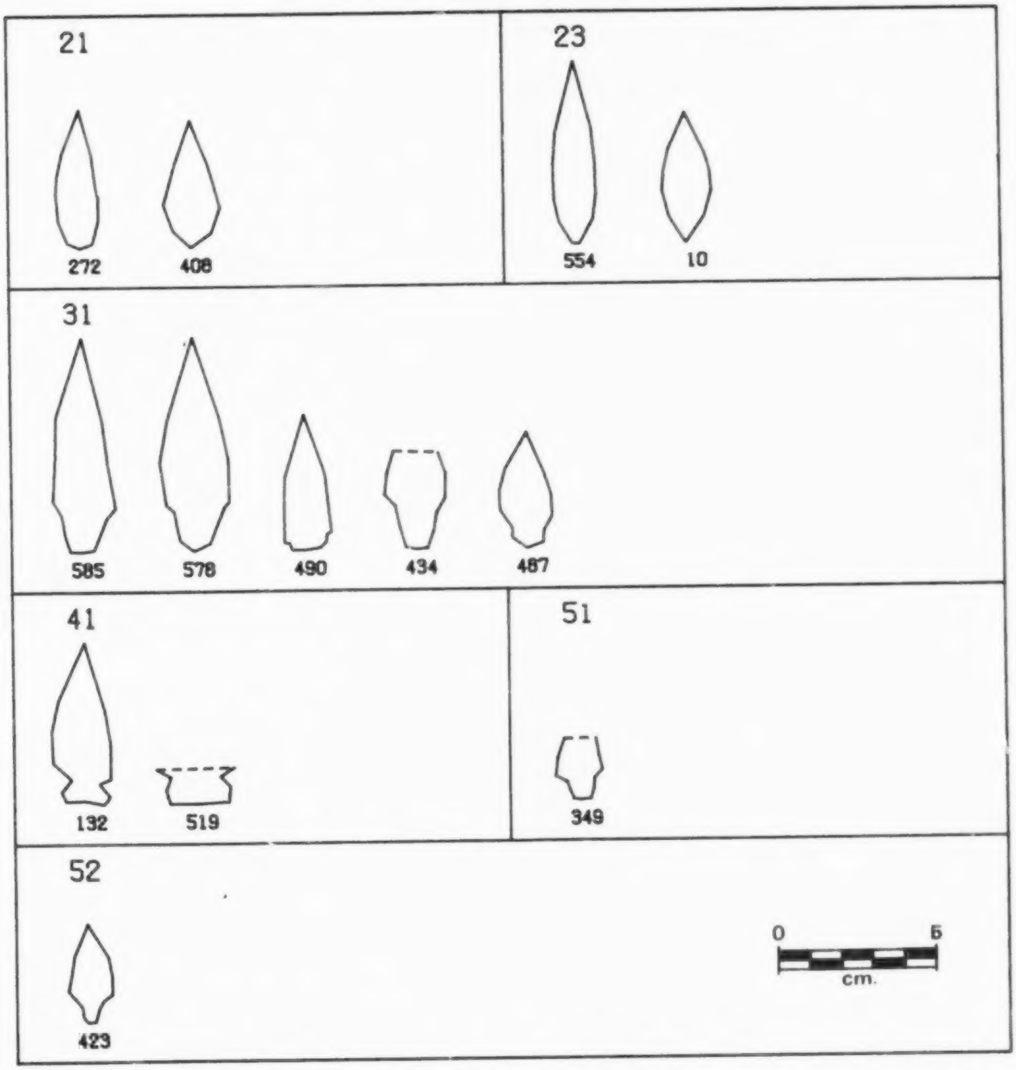
21
272
408
23
554
10
31
585
578
490
434
487
41
132
519
51
349
52
423
0
5
cm.

Figure B-1. Projectile point outlines from digitized measurements, 45-DO-273. Upper number is the historic type (see Figure 3-2 for key). Lower number is master number.

APPENDIX C:

FAUNAL ASSEMBLAGE, 45-DO-273

Family Sciuridae

Marmota flaviventris

Zone 3: 1 humerus fragment.

Zone 4: 1 mandible fragment.

Spermophilus sp.

Zone 3: 1 mandible fragment.

Family Geomyidae

Thomomys talpoides

Zone 1: 1 femur.

Zone 2: 1 mandible, 1 mandible fragment, 1 maxilla fragment, 2 humeri, 2 ulnae, 3 innominates, 2 femora, 1 tibia fragment.

Zone 3: 1 skull, 3 mandibles, 1 mandible fragment, 1 maxilla, 1 scapula, 1 innominate, 1 femur, 2 tibiae.

Zone 4: 3 skulls, 2 mandibles, 5 mandible fragments, 2 maxilla, 1 humerus, 1 ulna fragment, 1 femur, 1 femur fragment, 1 tibia.

Zone 5: 1 mandible, 6 mandible fragments, 1 scapula fragment, 2 humerii, 1 radius, 2 femora.

Family Heteromyidae

Perognathus parvus

Zone 3: 1 femur, 1 mandible fragment, 1 maxilla.

Zone 5: 1 femur fragment.

Family Cricetidae

Zone 2: 2 mandible fragments, 1 maxilla fragment.

Lagurus curtatus

Zone 1: 7 mandibles, 1 maxilla.

Zone 2: 1 mandibile.

Family Canidae

Canis sp.

Zone 1: 1 skull fragment, 1 scapula fragment, 1 humerus fragment, 1 innominate fragment, 1 femur, 1 calcaneus.

Family Cervidae

Odocoileus spp.

Zone 1: 1 distal fibula, 1 metatarsal, 1 astragalus, 1 naviculocuboid, 1 carpal.

Zone 2: 1 molar fragment.

Cervus elaphus

Zone 2: 1 metapodial fragment.

APPENDIX D:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

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